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EDITORIAL

A DIVIDED HOUSE

THE present issue of the JOURNAL contains two of the papers read at the Silver Jubilee in celebration of the enactment of the Weeks law. They stimulate reflection on the growth of sentiment for forest and scenic preservation in the United States, and its effect on legislative and administrative action.

"Not one cent for scenery," was the characteristic answer of the tough minded "Uncle Joe" Cannon, Speaker and firm ruler of the House of Representatives a generation ago, when a National Park in the Southern Appalachians was urged. Congressmen of the present day look at such matters differently. Public opinion has become sufficiently organized and public policy sufficiently defined to make legislators, always sensitive to what is popular and what not, more chary of outspoken opposition to the idea of spending money to protect the beauty of nature, and less in fear of setting up a dangerous precedent.

In 1901 Gifford Pinchot pointed out a conflict of two schools of thought. One was born of the struggle to subdue the wilderness. In any forest region, he wrote, the point of view of the agricultural settler is that of hostility to the forest, in the interest of expansion and material progress. "As settlement progresses and the forests disappear, a second phase of opinion crystallizes and becomes effective. Its center of distribution is in the towns or cities, and it is largely concerned with purely sentimental considerations. This school of thought regards the preservation of the forest as an unmixed good with the same unyielding depth of conviction which, among the early settlers, marked the opinion that its existence was an unmixed evil."

The antithesis is less clear-cut than this statement admits. Belief in waning timber supplies and in the harmful consequences of forest destruction upon human life through changes of the physical environment had gained wide popular acceptance as important economic reasons for seeking forest conservation. On the other side, many of those who chose to establish their homes beyond the outposts of civilization, loved the woods and the wilderness. The early settlers in the Adirondacks are an example. However, it is undeniable that, before the Pinchot-Roosevelt conservation movement took shape, the impetus to public action for saving the eastern forests had its main source in urban life and was in large measure inspired by sentiment, even when heavily cloaked in economics.

Before a latent public sentiment—whether sentimental or practical—can bring about public action, its expression must be evoked through leadership and organization. Colonel Pratt's paper "Twelve Years of Preparation for the Passage of the Weeks Law" is illuminat-

ing. Two physicians, enamored of the beauty of the Southern Appalachians, took counsel together how it might be saved for all time. One of them saw a way. Success would require years of work—perhaps more years than either of them would live; but eventually the thing could undoubtedly be done. That conviction must have been based on a profound belief that large numbers of people throughout the country were ready to respond to an appeal; that there was in the public mind something on which to build an organized movement powerful enough to override the certain and strong resistance to the startling political innovation of federal investment in scenery.

At that, the belief was sanguine. The attempt to get a law for eastern National Forests would have been hopeless had not a new force developed—the conservation movement of Theodore Roosevelt's presidency, under Pinchot's compelling and extraordinary leadership. On the high tide of that movement, the Weeks law was finally swept through Congress.

The conservation movement succeeded because it broke down the antithesis between the two schools of thought which placed in opposition the needs of material progress and the needs of civilized life for the protection of natural beauty and the preservation of some of the wilderness. Pinchot found a meeting ground for them. "From the point of view of national progress the one opinion is as mistaken as the other. Both are likely to be survived by that phase of thought which regards forest protection as a means, not an end; which contends that every part of the land surface should be given that use under which it will contribute most to the general prosperity, and the purpose of whose action is best phrased, in the language of President Roosevelt, as 'the perpetuation of forests by use'."

Those whose major interest in forest conservation concerned aesthetic and recreational values fell into line behind the new movement, creating a united front against exploitation. The union lasted until nearly the close of Pinchot's period as Chief of the Forest Service. The Roosevelt conservation program included provision for the National Parks, then drifting without a policy, by having them follow the "forest reserves" out of the Interior Department and into the custody of the Forest Service. Legislation for this was recommended to Congress at least twice in Presidential messages, and for a time was expected. But the gathering forces of opposition to Pinchot, Roosevelt, and conservation generally held action on this recommendation in check. Then suddenly a new situation arose.

San Francisco, dependent for its water supply upon entrenched private companies, reached out for Hetch-Hetchy; and Pinchot became convinced that the doctrine of highest use, based on the principle of "greatest good to the greatest number in the long run," justified granting the valley as a reservoir site for the city. Thereupon the united front broke. Foresters were roundly denounced as essentially materialistic in their concepts, able to see in trees only sawlogs, in waterfalls only horsepower, in great expanses of virgin forests only working circles and sites for lumber operations. The breach widened; it brought the demand for a separate National Park Service, in the Interior Department; and it has never been fully closed.

Probably in some ways the public has been the gainer. Competition in obtaining good will through acceptable services lessens the temptation to be bureaucratic, and stimulates initiative. The National Park policy has been very aggressively developed and popularized. The National Park Service and its friends are naturally—and quite properly—ambitious for it. But since its chief field of expansion as a land-administering and recreation-administering agency lies within the

field now assigned to the Forest Service, lacking some mutually agreed-upon principles on which to base a demarcation of the two fields, unedifying contests of strength are inevitable.

The view seems to be held by some that principles are not involved in these contests, but purely interbureau rivalry for jurisdiction. A contributor to the JOURNAL last summer doubted that the Society of American Foresters should express an official opinion on the bill for a Mount Olympus National Park, since no "important question of forestry standards is involved." The principal issue being "which of two types of land use shall be applied on a particular area", it was not properly the concern of the Society of American Foresters, which has members in both the Forest Service and the National Park Service and therefore should seek " to promote the interests of both groups, but not the interests of either group at the expense of the other." The argument holds good if the question at issue is limited to the interests of two federal organizations. That leaves it to both sides to line up all the support it can to influence Congressional votes in its favor, while nonpartisans stand on the sidelines. But if the question is primarily what will be in the best public interest, somewhere standards of judgment must be discovered.

The rivalry of these two agencies of public service has long been deplored. For a time it seemed that its regrettable features might be removed through defining standards by which the suitability of areas for one or the other form of administration could be tested. It has not worked. The struggle continues, and will continue until some better way is found for determining what is most in the public interest than Congressional hearings, with each contendant for jurisdiction seeking to marshal all possible auxiliary support from those who will take its side, and with each backed by its Department. The creation of pressure groups, organized propaganda to build up partisan support, and a spirit of detraction publicly manifested are unseemly consequences of a house divided against itself.

The most commonly advocated remedy is to place both Services in one Department. That course is naturally and understandably feared by both. Each feels that, were it transferred to the Department of the other, it would suffer the lot of the under dog. And that might easily prove true. Reorganization is not, at the present time, a wise way out.

What is needed is some agency concerned primarily with the public interest in sound land use, free from *parti pris*, and adequately qualified to determine satisfactory principles or applicable standards and to make consistent concrete recommendations. Obviously, the basic problem is one of land-use planning. Very happily, agencies concerned with this are developing. It is worthy of note that in the state of Washington the Mount Olympus question has been taken up by the State Planning Council. A committee of investigation studied the problem and submitted recommendations, on which the Council has acted. The conclusions reached differ substantially from the proposed treatments of the problem advocated respectively by the National Park Service and the Forest Service. As an impartial referee when the two Services have different conceptions of what is in the best public interest, a competent planning agency before which each Service comes on an equal footing promises much toward eliminating the evils of a divided house.

THE SECOND INTERNATIONAL FORESTRY CONGRESS

By JOHN D. GUTHRIE
U. S. Forest Service

THE following quotation[1] is apposite: "Someone has said that the great international scientific societies, which include kindred spirits from many lands, have done as much as any other lay organization for international peace and good-will. Scholarly folk who mingle and discuss problems of common interest in the realm of science do not relish war among nations. One of the most pitiful effects of the world war was the attempt of workers in common fields of research of the various belligerent countries to maintain their former cooperation and friendship in spite of war and political upheaval. . . .

"There is a spirit of international cooperation and inquiry abroad today that is becoming more real and intensive every year. Rapid means of transportation and international contacts are drawing the world closer together. The spirit of self-satisfied isolation is almost a thing of the past except in the halls of Congress. The technical and scientific student who does not adjust himself to the new age will find that his horizons are far too limited for present demands."

The idea of a truly international gathering or congress of foresters dates back to 1922. At the sixth annual general assembly of the International Institute at Rome in that year it was decided to invite all nations to a conference to consider world problems in forestry, especially wood supply and consumption. Following up this original suggestion, the First International Forestry Congress was held in Rome, from April 29 to May 5, 1926. This was attended by 18 Americans, headed by Dr. S. T. Dana, then President of the Society of American Foresters.

The Second International Forestry Congress took place in 1936 at Budapest, Hungary, September 10-17. This was attended by 14 Americans, made up of ten foresters and four lumbermen, as follows: F. A. Silcox, C. E. Rachford, Raphael Zon, John D. Guthrie, Ovid Butler, Tom Gill, John B. Woods, Shirley Allen, Henry I. Baldwin, and Richard R. Fenska, all members and delegates of the Society; and Ernest L. Kurth, Frank Kennett, G. F. Jewett, and Julian F. McGowin, lumbermen, delegates of the American Forestry Association. Nine of the above were in Europe at the time, traveling under the Oberlaender Foundation.

The Congress was preceded by a meeting of the International Union of Forest Research Stations, to which Dr. Raphael Zon was the American delegate.

Notables at Budapest

Between 35 and 40 nations and dependencies were represented at the Second Congress. In addition delegates were present from five related bodies such as the International Institute of Agriculture, International Committee on Wood (C.I.B.), International Wood Gas Committee, International Travel Bureau, and the International Union of Forest Research Stations. The estimated total number of delegates of various classes was 525. The heads of many of the forest services of Europe were present, including Sir Roy Robinson, Chairman of the British Forestry Commission, Dr. E. D. Van Dissel, head of the Dutch Forest Service, Baron

[1]Brannon, C. H. Contributions to citizenship by modern language courses in scientific literature. Mod. Lang. Jour. 20:259-264. 1936.

von Keudell, Generalforstmeister of Germany, M. Rene Chaplin, Director General of the French Forest Service, Dr. A. K. Cajander, Director General of Finnish Forests, and F. A. Silcox, Chief, U. S. Forest Service.

Baron Clement Waldbott of Hungary was President of the Congress. The four Vice-Presidents were von Keudell of Germany, Robinson of Great Britain, Silcox, United States, and Chaplin, France.

The Congress was held under the patronage of the Regent of Hungary, Nicolas Horthy; its Honorary President was Jules de Gömbös, President of the Hungarian Council, and Minister of Agriculture Coloman de Daranyi headed the Committee of Honor; and the Co-Presidents of the Congress were Baron Giacomo Acerbo, President of the International Institute of Agriculture at Rome, and Dr. A. K. Cajander, Director General of Finnish Forests.

The number of delegates from each country varied greatly. Several countries had only one, while some neighbor nations had as many as 25 or 30. Chile, Brazil, and the Argentine were the only South American countries represented, and there were no delegates present from Canada, Mexico, Russia, or Japan.

Sections

The Congress was organized into 9 sections, as follows: I. Forest policy, economics, statistics, and legislation; II, forest management, research and education; III, timber trade and forest products; IV, forest utilization and industry; V, mechanical and chemical technology of wood; VI, silviculture and plant production; VII, regulation of forest streams and forest and soil protection; VIII, rural economy, nature protection, tourist recreation; IX, tropical forestry.

The Congress opened with a general meeting of all delegates. This was followed by meetings and deliberations of the 9 sections, which met simultaneously. There was a general closing session, when the resolutions (32 in number) were acted on.

In contrast to the Rome Congress of 1926, no formal reports or papers were read before the Congress but printed copies of all papers were available to all delegates on the first day of the Congress. The formal reports prepared for the Congress will appear later in the Proceedings. Butler, Allen, Gill, and Guthrie had submitted papers in advance. The omission of the formal reading of papers at this Congress was a welcome change from the Rome conference, since is expedited the section meetings. Each section decided which papers, out of the large number presented, should be discussed at its meetings.

Mr. Silcox, among other nationals, made an address at the opening session, served on the executive committee, and took an active part in the deliberations of the Congress. He was chairman of the American delegation, and Guthrie was vice-chairman. Zon served as "rapporteur" (secretary) of the meetings of Section V, Wood Technology, and Guthrie as vice-chairman of Section II, Forest Management, while different Americans participated in the meetings of those sections in which they had a special interest. French and Hungarian were the official languages, but interpreters were available at all section and general meetings.

Field Trips

Several field trips were participated in by the Americans; one to Lake Balaton, the largest lake in Hungary, with its extensive summer home development; several other one-day trips, about the city and environs; and a 3-day trip to several state forests, two government tourist resort hotels (built and managed by the Hungarian Forest Service), the Hungarian

Plains, the country of Hortobagy, cattle- and horse-raising region of Hungary. Here as elsewhere were seen considerable areas of our black locust, introduced into Hungary between 1700 and 1730. A special point of interest in the Plains was the extensive areas of solid grass turf, with no evidence of overgrazing or abuse, although this region has been in continuous use by livestock for probably a thousand years. After the Budapest meeting most of the Americans visited forests and forest properties in Czechoslovakia, Austria, and Germany under the auspices of the Oberlaender Foundation.

The Social Side

On the social side there was much activity. A formal reception to the delegates was given by the Regent of Hungary, Admiral Nicolas Horthy, in the Royal Palace, at which the Regent held a brief personal chat with the head of each delegation; and formal dinners to the heads of the different delegations by Minister of Agriculture Daranyi, by Baron Clement Waldbott, President of the Congress, and by Dr. Cajander, head of the Finnish delegation, were followed by a musicale at the Finnish Embassy. There was also an informal joint dinner between the British and American delegates (the wines for which were furnished through the courtesy of Mr. Charles Lathrop Pack), and an informal dinner of the American and leading German delegates.

The city of Budapest proved to be of great interest to all. It is a beautiful and historic city, lying on each side of the Danube, and the Hungarian foresters and officials were delightful hosts.

Important Decisions

Certain definite and important decisions were taken by the Congress. A permanent organization or committee, to be made up of one official or government representative from each interested nation, was set up to carry on between Congresses, with permanent headquarters to be in connection with the International Institute of Agriculture at Rome. This permanent committee is to have the greatest possible autonomy in its relation to the International Institute. Its annual or periodic meetings would be held not in Rome, but in the various member countries.

The location of the permanent committee's headquarters in Rome was not decided without opposition; the International Committee on Wood (C.I.B.) strongly urged that Vienna be selected as the headquarters, while another faction put up a stronger plea for Berlin. The present central organization committee (of the Second Congress) will function temporarily until the permanent committee is set up.

Invitations for the next Congress were received from France, to be held in Paris in 1937, in connection with its International Exposition of Wood, and from Finland to be held at Helsinki (Helsingfors) in 1940. The permanent committee will decide later as to the place of meeting of the next Congress.

THE INTERNATIONAL FORESTRY CONGRESS RESOLUTIONS

A summary of the resolutions passed at the Budapest Congress is here submitted in lieu of the resolutions in full, which are too voluminous for inclusion in the JOURNAL. The summary has been made by the Editor-in-Chief of the JOURNAL, who is responsible for any inaccuracies.

Resolution 1 concerned the creation of a permanent International Forestry Committee to arrange for future Congresses and to give effect to their wishes; the Committee to be in the organizational set-up to the International Institute of Agriculture at Rome, but with the widest possible autonomy.

Resolution 2 pointed out the great importance of cooperative associations in forest economy, to assure the proper management of small properties; recognized that hitherto the necessary cooperative movement has not been got under way; urged consideration of the possibility of legislation requiring cooperative associations where the division of forest properties makes efficient management impossible otherwise; and recorded its wish that the obstacles to the development of cooperatives be removed and that consideration of the measures necessary to this end be recommended to the governments of the various countries by the International Institute of Agriculture.

Resolution 3 stressed the importance of forest credits and requested the International Institute of Agriculture to take charge of publication of the results of a study of the subject, to which the nations were asked to contribute by reporting as to the measures taken in each country, their outcome, and the reasons for their success or failure.

Resolution 4 recommended that, since figures for forest areas do not make possible a proper comparison of wood or forest production, in all publications on the subject of areas there be given also the average annual increment.

Resolution 5 expressed the wish "that the committee on International Forest Statistics and the International Union of Forest Research Institute introduce measures for the adoption of uniform methods and terms in establishing the forest balance so as to make comparisons possible between the forest statistics of different countries and make the forest statistics of the world as uniform as possible"; and recommended that the various countries organize (1) a uniform inventory of forest resources, to be revised from time to time, showing the capital and annual increment in wood, and (2) an accurate permanent statistical record of timber cut and wood utilization, to be developed on the largest possible scale.

Resolution 6 recommended research with respect to methods of management for small private forests, which call for entirely different management plans from those applicable to forests of large area.

Resolution 7 advocated more intensive research in the various countries to determine the cause of fluctuations in the annual increment of trees and forest stands.

Resolution 8 concerned the desirability of enlarging the present provisions for publishing on an international basis summaries of works and articles appearing in the various countries and languages.

Resolution 9 held the organization of a Committee desirable, to study the question of fixed international standards and a uniform terminology for sawn lumber, which would aid to make commerce and international usages uniform.

Resolution 10 recommended that the coefficients used in the various countries in converting into actual cubic volume be gathered, correlated, and published.

Resolution 11 recommended the creation of a commission to study the prob-

lem of organizing and regulating timber markets, to report to the next International Forestry Congress.

Resolution 12 formulated the following expressions of opinions:

1. That "the state, through proper legislation, should intervene not only in matters concerning forest management but also in the exploitation and industrialization of timber products, so as to establish the necessary harmony between capital, labor, and nature. The application of this general principle may prevent dumping in the world market.

2. "The state should also intervene with a view to bring about a standardization of the production of unmanufactured timber by regulating the cuttings in every country.

3. "Likewise, to encourage the consuming industries to utilize byproducts and waste.

4. "To bring about international cooperation between the forest research institutes and forest administrations which would usefully promote the increased production and sale of resin.

5. "To provide for the gathering of forest seed by the forest administrations and forest research institutes and for the interchange of the data obtained with every country."

The resolution also favored the setting aside in every country of a special week "demonstrating the importance of the fruits and plants of the forest", to increase their value and intensify their utilization."

Resolution 13 stressed the importance of forest geography, suggested more attention to the study of geographical conditions in their relation to forest economics, advocated the organization of special sections for the study of political forest economy in the forest research institutes, and expressed the wish that forest geography be introduced as a special study in the forestry colleges and schools.

Resolution 14 dealt with the need for greater national and international provision for mechanical and chemical wood research, for international cooperation in standardizing its principles and methods and "looking towards a uniform regulation of the supply of wood in the international market", and for special national organizations to deal with the problem of wood utilization; etc.

Resolution 15 requested that the governments of the nations represented pay special attention to the great importance of getting forest seed suitable for the site, and that they choose from the methods of obtaining guaranteed seed those best suited to their special conditions.

Resolution 16 requested the Silvicultural Section of the International Institute of Agriculture to gather all data on the organization of seed production in the various countries, and favored publication of the results by the Institute.

Resolution 17 concerned measures for permanent control of forest-tree seed origin and the methods necessary to establish proof of origin.

Resolution 18 pointed out the importance of forest types as a guide to silviculture and the desirability of international cooperation in "the study of the sociology of forest plants", with a standard terminology for forest types, to be followed in international "forest phytosociological cartography".

Resolution 19 declared that the forestation of waste areas is one of the most important economic problems of the near future, and expressed the belief that the forestry groups should urgently call this to the attention of their respective governments and should be asked to work out for future forestry congresses reports on what is being done. International statistics on the subject were held desirable.

Resolution 20 requested the International Institute of Agriculture to publish as soon as possible the data now available concerning waste lands.

Resolution 21 expressed the sincere gratitude of the Congress to the Silvicultural Section of the International Institute of Agriculture for the monograph which it has promised to publish on the international inquiry concerning the correction of torrents and the conservation of mountain lands, and for the publication in the monthly Bulletin of technical information relative to the improvement of mountain lands; and requested that the publication be sent out not only to every country, but to the members of the Congress who are interested in the problem.

Resolution 22, taking cognizance of the studies made in torrent correction by forestry methods, recommended that artificial works should never interfere with "the natural evolution on a torrential territory, but should influence it intelligently in a way favorable to our purpose".

Resolution 23 concerned forestation by terraces, and methods of terracing.

Resolution 24 recommended a uniform plan of observation stations for studying the surface runoff of meteorological waters from both waste-land and forested areas.

Resolution 25 recommended that all mountain restoration be intrusted to foresters, on the ground that the administrative agencies (of forestry, hydraulics, and agriculture) interested in the important public economic problem of torrent correction should be united in a "single department which will guarantee to executive organizations the accomplishment of results".

Resolution 26 concerned gully fixation methods.

Resolution 27 advocated the study of forest fire damage problems in the various countries, and a discussion of forest fire insurance at the next Congress.

Resolution 28 made a recommendation for obtaining data on the specific insect problem of May bugs (Melolontha).

Resolution 29 recommended the study of all epidemics of harmful insects in their place of origin by professional forest entomologists directed by a central institution for each country or, depending on its size, for a subdivision of a country. Certain lines of research needed were pointed out; both portable and stationary forest laboratories for use in the studies were held necessary; and studies at forest stations to be located in remaining virign forests, for the purpose of investigating the movements in an unaltered natural environment of the principal harmful insects threatening cultivated forests and learning the favorable and unfavorable factors there present, were advocated.

Resolution 30 sought to call to the attention of the nations the need of measures to meet the serious danger of loss of scenic beauty of the forest, and invited all forestry associations to put forth increased effort on behalf of protecting nature, by establishing contacts with other organizations interested in this field and by cooperating in educating youth to an appreciation of forest scenery.

Resolution 31 recommended action by the interested governments to lessen the great damages in the French and English colonies south of the Sahara Desert resulting from excessive forest cutting, land clearing and pasturage, and uncontrolled forest fires. Reforestation of the most critical areas was recommended, as well as protection of all existing forest lands and regulatory control of land use.

Resolution 32 requested the International Institute of Agriculture to take certain steps "so that the nations which are members of the Institute may be informed, at least three months in advance of each International Forestry Congress, of important matters concerning tropical forests".

TWELVE YEARS OF PREPARATION FOR THE PASSAGE OF THE WEEKS LAW[1]

By JOSEPH HYDE PRATT

Director, American Forestry Association

THE first advocacy in writing of the establishment of a national forest reserve or park in the Southern Appalachian Mountains was on October 29, 1885, in a paper presented before the American Academy of Medicine by Dr. Henry O. Marcy, of Boston, Mass. His subject was "Climatic Treatment of Disease: Western North Carolina as a Health Resort", and his paper was published in pamphlet form.

The leader in organizing a definite movement for legislative action was Dr. Charles P. Ambler, who moved from Ohio to Asheville in 1889, and soon afterward began to advocate either state or federal control of the higher mountain tops. On a fishing trip in the Sapphire section of North Carolina he broached the subject to Judge William R. Day of Ohio, and asked his advice. Judge Day at first regarded such a reservation as an impossibility, but several days later he returned to the subject, saying he believed something might be done; and in June, 1899, he outlined a detailed plan of action for organizing and developing local sentiment, obtaining newspaper cooperation, building up support for the idea elsewhere in the state, getting legislation before Congress, and awakening interest in the project throughout the country. He foresaw that in the beginning the proposed legislation would receive scant notice in Congress; but he was confident that, if persistently pressed, eventually nothing could stop the movement, though success might not be realized within his or Dr. Ambler's lifetime.

The Asheville Board of Trade became interested, and on October 9, 1899, appointed a Parks and Forestry Committee. This launched what at first was known as the "National Park Movement," since its purpose was thought of as to obtain in the Southern Appalachian region something corresponding to the Yellowstone National Park. On October 18 the Parks and Forestry Committee sent fifty letters to governors, senators, and representatives in North Carolina, South Carolina, Georgia, Alabama, Tennessee, and Virginia, requesting permission to use their names in calling a convention for the purpose of organizing a National Park or Forest Reservation Association. The convention was held November 22 and 23, 1899, and perfected the organization of an association. There was considerable discussion as to what its name should be. Dr. Ambler proposed "The Southern National Park and Forest Reserve Association", but the name finally adopted was "The Appalachian National Park Association". The membership of the Association was from Maine to Louisiana and from several western states. The first President was George Powell of Asheville, and the Secretary, Dr. Ambler.

One of the first acts of the Association was the preparation of a memorial to Congress which was presented to the United States Senate by Senator Pritchard on January 2, 1900, and referred to the Committee on Agriculture. On April 17 the officers of the Association and others appeared before the Committee to present the case for the Park. They were in-

[1]Revised form of address before the Silver Jubilee in observance of the passage of the Weeks Law held at Bretton Woods, N. H., September 13-15, 1936.

formed that Congress could do nothing with the memorial unless the states involved cooperated by passing legislation which would cede to the federal government the right to acquire title to land in these states, and exempting such lands from taxation. North Carolina passed such a bill on January 18, 1901, South Carolina and Georgia on January 29, Alabama on March 21, and Tennessee and Virginia on March 28. Prof. J. A. Holmes, who was at that time State Geologist of North Carolina, and several of his associates appeared before the General Assemblies of these states urging the passage of the requested legislation.

The Association's Committee also realized from the hearing before the Senate Committee on Agriculture that more definite information would have to be available before favorable consideration of the bill could be expected. Senator Pritchard therefore introduced, on April 21, 1900, a bill appropriating $5,000 for a preliminary investigation of the need for the creation of forest reserves. This bill passed the Senate April 26, 1900 (very quick action), and became a law on July 1, 1900.

The Association's Committee further realized that a great deal of educational work was going to be necessary in order to create throughout the country interest in and a demand for the forest reserve or park. At the suggestion of Senator Pritchard, petitions were circulated setting forth eleven reasons why there should be a National Park in the Southern Appalachian Mountains. About six thousand copies of the petition were sent out, and it was estimated that between 600,000 and 700,000 signatures were obtained. The petition was presented to Congress by Senator Pritchard.

During the summer of 1900, members of the federal Division of Forestry and members of the North Carolina Geological Survey, which had supplemented the appropriation of Congress, made a preliminary investigation of the Southern Appalachian Mountains from Virginia to Alabama; and on January 1, 1901, the Secretary of Agriculture, Hon. James Wilson, sent a report on this investigation to the President. On January 19, 1901, President William McKinley sent a special message to Congress transmitting the report and recommending its favorable consideration.

On January 10, 1901, Senator Pritchard introduced a bill appropriating $5,000,000 for the establishment of a forest reserve in the Southern Appalachian Mountains.

Early in 1901 it was learned that Congress had gone on record as opposing the purchase of land at any future time for National Park purposes, and therefore the Association changed its name to Appalachian National Forest Reserve Association. Mr. Cannon, Speaker of the House of Representatives, emphasized this decision of Congress by saying: "Not one cent for scenery."

The investigations of the Southern Appalachian region continued during the spring and summer of 1901 by representatives of the U. S. Geological Survey and the North Carolina Geological Survey. Among those connected with the state survey who assisted in determining the effects of erosion, the conditions of the region, the value of forest lands, and the areas considered suitable for National Forests were: J. A. Holmes, State Geologist; W. W. Ashe, forester; Horace B. Ayres, Prof. L. C. Glenn, and Prof. J. Volney Lewis, geologists; E. W. Myers, hydraulic engineer, and Joseph Hyde Pratt, geologist.

In 1901 Prof. J. A. Holmes also arranged for two groups of federal and state representatives to make personal investigations of the region. In the first group were the Hon. James Wilson, Secretary of Agriculture, Gifford Pinchot, Chief of the U. S. Bureau of Forestry, F. H. Newell and W. J. McGee of the

U. S. Geological Survey, Hon. Theo. F. Klutz, Member of Congress from North Carolina, J. A. Wilson, private secretary to the Secretary of Agriculture, and Prof. J. A. Holmes and W. W. Ashe of the North Carolina Geological Survey. This group spent from July 3 to July 10 investigating the sites within which it was proposed to locate the forest reserve. In November, 1901, the second group, including Senator F. M. Simmons of North Carolina, Congressmen Johnson of South Carolina and Brownlow of Tennessee, Judge James C. MacRae, and Rutherford P. Hayes of North Carolina, made a trip of investigation with Professor Holmes in the Blue Ridge and Great Smoky Mountains.

On December 4, 1901, Senator Pritchard introduced a bill carrying an appropriation of $5,000,000 for the purchase of 2,000,000 acres of forested lands in the Southern Appalachian Mountains; and on December 6, 1901, Congressman Brownlow of Tennessee introduced a similar bill in the House of Representatives, carrying $10,000,000 for the purchase of 4,000,000 acres. Before either of these bills was considered a very complete and comprehensive report of the investigation authorized by Congress was sent to President Theodore Roosevelt by Secretary of Agriculture Wilson, and was transmitted to the Senate and the House by the President December 19, 1901, with a special message in which he said: "With this conclusion I fully agree, and I heartily recommend this measure to the favorable consideration of Congress." The report was published as Senate Document 84 of the Fifty-first Congress. The bill introduced by Senator Pritchard passed the Senate January 25, 1902 (again rather quick action); but it did not pass the House.

During the summer of 1901, through the North Carolina Geological Survey and the Asheville Board of Trade, tentative options were obtained on 494,200 acres of forest land, which could have been purchased at that time for $1,673,000, including the timber and with no water power or mineral restrictions. In the immediately following years the North Carolina senators and congressmen, ably assisted by other southern senators and congressmen, worked unsuccessfully for favorable legislative action; one year a bill carrying a five to ten million dollar appropriation would pass the Senate but die in the House, then in another Congress a bill would go through the House but die in the Senate.

In 1901 and 1902 there was opposition from some of the large lumber interests, but this opposition was finally overcome, and on May 16, 1902, a resolution by the National Hardwood Lumber Association favoring the proposed reservation was adopted. The opposition subsided when the lumber interests, which had previously believed the measure would stop lumber operations, realized that it meant simply the cutting of timber in accordance with scientific forestry practices.

Through the activity of the Appalachian Forest Reserve Association and the North Carolina Geological Survey, sentiment favorable to the establishment of forest reservations in the Southern Appalachian Mountains was continually growing. It was early realized that the Association was handicapped by the fact that the measure was a Southern proposition, and with the exception of Senator Pritchard was largely sponsored by Democrats. At the suggestion of Dr. Ambler, a committee of the Association was appointed to seek the cooperation of influential persons in the North. This committee, consisting of J. A. Holmes and Dr. Ambler, made several trips in the North. Among the prominent men interested were Senators Chauncey M. Depew of New York and Dr. Henry O. Marcy of Boston. On June 7, 1902, Senator Depew made an eloquent speech before the Senate in favor of the pending bill "for the purpose of estab-

lishing a national forest reserve in the Southern Appalachian Mountains to be known as the National Appalachian Forest Reserve". During 1903 and 1904 the North Carolina Geological Survey, through its director, its forester, and other members, devoted considerable time to the preparation of reports on forests and forest conditions in the Southern Appalachian Mountains, and to appearances before Congressional committees and association meetings both in the South and in the North. New England had become interested in the establishment of a forest reserve in the White Mountains of New Hampshire and had begun to advocate eastern national forest reserves. The American Forestry Association was very actively interested. At its call a Forestry Congress was held in Washington on January 2 to 6, 1905, at which the following resolution was passed:

"RESOLVED, That this Congress approves and reaffirms the resolutions of various scientific and commercial bodies during the past few years in favor of the establishment of national forest reserves in the Southern Appalachian Mountains, and in the White Mountains of New Hampshire, and that we earnestly urge the immediate passage of bills for these purposes."

In the latter part of 1905, the American Forestry Association having decided to push vigorously for the combined Northern and Southern program, the Appalachian Forest Reserve Association decided to withdraw from the field in favor of the older and nationally more influential organization; and accordingly, on December 2, 1905, it dissolved.

In 1906, two separate bills having been introduced for eastern forest reserves in the North and the South respectively, the Senate Committee on Forest Reservations and the Protection of Game, to which these bills had been referred, submitted a favorable report (on April 11) in which it was stated: "It was deemed advisable to report an original bill (S. 4953) in lieu of the two bills referred to the Committee. This bill is substantially the legislation recommended by the American Forestry Association and the National Board of Trade."

On April 25, 1906, the House Committee on Agriculture held a notable hearing on this bill. Among those who spoke for the bill was Theophilus Parsons, of Boston. He dwelt chiefly on the manufacturing interests and water powers that were involved, and stated: "I have with me petitions signed by various interests using these powers—interests representing over $130,000,000, and also a letter from Governor Curtis Guild of Massachusetts, commending the bill". Others in attendance and supporting the bill were Gov. R. B. Glenn of North Carolina, Gov. John McLane of New Hampshire, Augustus T. Smyth of Charleston, S. C., C. C. Goodrich of Hartford, Conn. (representing the Connecticut delegation), Prof. L. C. Glenn of Vanderbilt University, Nashville, Tenn. (who made one of the most telling talks at the hearing), Dr. Eugene A. Smith, State Geologist of Alabama, J. H. Stewart of West Virginia, Rev. Edward Everett Hale, E. C. Watson, Commissioner of Agriculture of South Carolina, Harvey N. Shephard of Boston, Gifford Pinchot, W. S. Lee of Charlotte, N. C., Geo. Harvey of Providence, R. I., Henry Fries of Winston-Salem, N. C., Philip W. Ayres of Concord, N. H., and Joseph Hyde Pratt, State Geologist of North Carolina.

Although the bill did not pass, the hearing and the Senate Committee report advanced the cause considerably.

The Conference of Governors called by President Theodore Roosevelt in 1908 and its consideration of conservation measures was of peculiar assistance to this cause. One outcome of the Conference was the appointment by the President of a Conservation Commission.

In the fall of 1908 the President's Conservation Commission, consisting of Hon.

Charles S. Scott of Kansas, Chairman of the House Committee on Agriculture, Senator Reed Smoot of Utah, Prof. H. S. Graves, Director of the Yale School of Forestry, and William Irvin of Wisconsin, together with W. L. Hall of the U. S. Forest Service and Joseph Hyde Pratt, State Geologist of North Carolina, made an inspection trip through the mountains of North Carolina and Tennessee. On this trip it was possible to show the Commission the final result that would be expected if the forest areas of the mountain sections of the Southern Appalachian Mountains were cleared and eroded. The information obtained by this commission was embodied in a report to the President, which was transmitted to the Senate and the House and was undoubtedly one of the more important factors that finally brought about the enactment of the Weeks law. The North Carolina Geological Survey, the American Forestry Association, the Society for the Protection of New Hampshire Forests, and the North Carolina and New Hampshire members of Congress continued their efforts to keep before the House and Senate Committees information relating to the need and the nation-wide desire and demand for National Forest Reserves in the eastern United States, and their importance to the protection of streams in their relation to navigation and water power.

As the Southern states had obtained the interest and support of the Northern states, so the New England states sent west Philip Ayres, who enlisted the interest and support of Middle Western states. Sufficient pressure was finally obtained to overcome the resistance of the Speaker of the House and the Rules Committees, and the Weeks Bill was passed and became a law in 1911.

PLANNING COMES TO THE TENNESSEE VALLEY

By RICHARD J. PRESTON

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THE Roosevelt administration has entered upon no activities more prophetic or constructive than the gigantic experiment in economic planning which is being attempted by the Tennessee Valley Authority.

In the vast natural basin, which drains the Tennessee River and its tributaries and which includes over forty thousand square miles in portions of some seven states, dwell two million Americans. These people for the most part are of good Anglo-Saxon stock, but for lack of foresight in the use of their land and for lack of economic opportunities they are now living lives of unbelievable poverty and hopelessness. The misuse of the resources with which this valley was endowed has gutted the once fertile land with gullies and worn out the soil; has stripped the hills of their erosion-checking forests; and has left the rivers yellow with silt (topsoil from the farms), uncontrolled, their mighty power little used, and with the constant menace of havoc-wreaking floods.

Wastes such as these have ravished a once prosperous region and have brought about the even greater wastes to which Arthur E. Morgan, chairman of the board of T.V.A., refers: "I mean those wastes of the energies, ambitions, and hopes of vast numbers of men and women which are almost killed through lack of opportunity. . . . Greatest of all wastes is that which comes when people fail to see the great possibilities and opportunities around them, and when, in that failure to see what might be, they resign themselves to things as they are."

The Authority comes to this region in the hope that a planned use of land and water, and a wise industrial expansion in an area rich in undeveloped natural resources, can bring a "fuller life" to the inhabitants and transform a backward region into a vital, prosperous, forward-looking community. As the agency for carrying out this great social and industrial design, T.V.A. takes on a national significance, and the valley of the Tennessee River becomes a proving ground in which it will be determined whether man can, by coordinated, unselfish efforts and comprehensive planning, improve the physical surroundings of his environment and, in place of lack and misery, bring plenty to all.

This Authority should command the interest of every thoughtful American, for if successful it may well herald the beginning of a new era, bearing the promise of a constantly enlarging and improved control over social forces and physical environment. If it succeeds it will point the way in which we can march on to the rehabilitation of other great natural units. The work will not be finished in ten years or perhaps even in one hundred; it will be beset with difficulties and dangers that may uproot most of its promise and accomplishments; but as an effort both unique and audacious in its scope it demands our attention and study.

The Tennessee is a big river, bigger than is generally realized. It contains a larger volume of water than the Ohio where these two rivers join. In early days the river was the center of a prosperous plantation life. Transportation was badly needed and before the railroads were constructed the river presented the most practicable means of supplying

this need. There were, however, serious handicaps in the way which had to be overcome; chief of these was a series of rapids about thirty-seven miles long, which has been known, since very early days, as Muscle Shoals. To overcome this barrier, the Muscle Shoals Canal was opened in 1831 and enlarged in 1890. As with the majority of our inland waterway projects, this canal was never of much utility. Even after 1890 it was still too small for most practical use, and it has been virtually abandoned.

The river next received attention during the World War with the inception of the Muscle Shoals project and the fifteen years of subsequent controversy concerning it. The National Defense Act was passed in June, 1916, at which time it appeared likely that we would soon be drawn into the War. One section made provision for a sum of $20,000,000 to enable the President to bring about the construction of a nitrogen fixation plant. We were at this time dependent upon Chile for our nitrates, and since modern war is largely a series of nitrogen reactions whereby explosions take place, it was deemed wise to secure a domestic supply of the all-important nitrogen. After much thought President Wilson selected Muscle Shoals for the site, and Wilson Dam was built near the northwest boundary of Alabama.

This location was a good one, but we had entered the War before the decision was made and the War had ended long before any nitrogen was manufactured. This left the government with a gigantic white elephant on its hands and the question of what to do with it was argued in and out of Congress for the next fifteen years. The investment had been a large one; the dam and two nitrate plants cost $137,000,000.

During the fifteen years of controversy raging over the disposition of this investment, there were a few high points worth mentioning. In 1925, Henry Ford offered to buy the plant for $5,000,000. Agricultural agencies supported this proposal vigorously, for it meant cheaper fertilizers. The bill passed the House but was so amended in the Senate that the offer was withdrawn. Nothing more came of this proposition. In 1928 and again in 1931, a bill introduced by Senator Norris, to provide for government operation or leasing of the plant, passed both houses of Congress but was vetoed by the President. For fifteen idle years the potential power of this great plant continued to rush irretrievably over the dam in the form of yellow, swirling water.

With amazing promptness on April 10, 1933, just a few days after his inauguration, President Roosevelt sent a message to Congress and the whole United States, setting forth his views for the solution of the Muscle Shoals problem as well as for all the interlocking problems of the Tennessee valley. In a month he had signed a bill, passed by both houses of Congress, in which were incorporated all of his plans. These are best set forth in his message, which is a very notable statement and which will probably be considered among the great conservation documents of all time. In the greatness of its concept and the scope of its plan it marks a new era in the field of conservation.

"The continued idleness of a great national investment in the Tennessee valley leads me to ask the Congress for legislation necessary to enlist this project in the service of the people."

But the President had much more in mind than this:

"It is clear that the Muscle Shoals development is but a small part of the potential public usefulness of the entire Tennessee River. Such use, if envisioned in its entirety, transcends mere power development: it enters the wide field of flood control, soil erosion, afforestation, elimination from agricultural use of marginal lands, and distribution and diver-

sification of industry. In short, this power development of war days leads logically to national planning for a complete river watershed involving many states and the future lives and welfare of millions. It touches and gives life to all forms of human concerns."

This is the lofty goal which the Tennessee Valley Authority has set for itself. But what authority has been given this organization? What steps have been taken to free it from the ponderous "red tape" and ruinous political ineffectiveness that has generally come to be associated with governmental enterprise? To continue with the President's message:

"I, therefore, suggest to the Congress legislation to create a Tennessee Valley Authority—a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise."

Thus a great federal project has been taken out of the hands of governmental bureaucracy and placed under the complete authority of a corporation, separated from, but owned by, the government. The purpose, manifestly, is to free the entire project from the deadening inefficiency accompanying political administration. To date this purpose has been successfully accomplished, thanks to the determined efforts of Senator Norris and A. E. Morgan. Without doubt the possibility of the Tennessee Valley Authority's achieving its lofty purposes in the future depends upon the continuation of this freedom. If by this Authority it can be demonstrated that government undertakings can be kept free from politics, it will be a precedent almost as far reaching as the achievement of the aims of the Tennessee Valley Authority itself.

Human failure can be attributed, more than to any other one cause, to lack of adequate planning. As our infant Nation grew into its natural heritage, the need was for the development, the exploitation even, of our apparently unlimited and diversified natural resources. The rapid conversion of these resources into capital was necessary for expansion and was justified, perhaps, in spite of the appalling wastes which resulted. It was the spirit of the pioneer that prevailed; the spirit of the rugged individualist, who by his own efforts might wrest a rich harvest from the plenty about him. The essence of this rugged individualism was self-dependence and freedom from government restrictions. By it the country experienced unparalleled growth in industry and population; by it was created the most amazing and widespread wealth ever known on this earth; by it also we sustained tremendous wastes. Wastes in resources both physical and human; ruined land, ruined forests, ruined communities of human beings. The era was one of magnificent and ruthless development. From this uncoordinated growth arose duplication, destructive competition, and widespread poverty. Such wastes were masked so long as the frontier remained to offer new promise to the sturdy.

The day of unlimited agricultural land and of inexhaustible forests and mineral resources has passed. As a physical entity the frontier has vanished. It is time to take inventory of what remains and repair, in so far as possible, the destruction wrought in the exuberance of our youth. With wise use and the solving of the problem of distribution there should be ample for the needs of everyone.

Herein lies the great significance of T.V.A. If successful, the benefits accruing to the valley itself will be of small consequence in comparison with the workable plan made available for the Nation as a whole. Dr. H. A. Morgan, who came to the directorship from the presidency of the University of Tennessee, said, "The fundamental purpose of the T.V.A. is to provide a basis for national coordination. All these (other) activities are subordinate to the creation of a procedure which may confidently be applied

to the whole country." Coordinated, practical, big-scale planning is as pressing a need as any confronting us today.

Arresting indeed, in its scope and magnitude, is the plan for the rehabilitation of the valley of the Tennessee. Theoretically T.V.A. was created for the purpose of developing a unified control and use of the water resources of the river system. This purpose would include flood control and navigation. As a by-product from the dams built, power would be generated. Only a fraction of the immense quantity of power made available would be required in the operation of the locks; the rest would be sold. This development would act as a yardstick of private power rates and put teeth into the federal regulation of the utilities, wherein arises the bitterest opposition encountered by the Authority.

When dams are built, reservoirs are created and, if the dams are to retain their utility, these reservoirs must be protected against erosion. This need forms the basis for the land policy of the Authority, which embraces forestry and agriculture as well as actual erosion control measures. Effective land use demands fertile soil and, to this end, cheap available fertilizers. The great nitrate plant has been modernized, and improved methods are being sought for converting atmospheric nitrogen and the phosphates of the region into essential plant foods. This industry will also constitute an outlet for surplus power. The valley contains hitherto unexploited deposits of minerals. It is hoped that cheap power will aid in the development of these resources. To this end the deposits are being located and their possibilities studied as an incentive to industry.

Social rehabilitation is bound up in all this activity. Increased availability of fertilizers, sound advice, and the retirement of marginal lands from cultivation will not only check the menace of erosion, but will also improve the level of farming; and the resulting increase of the farmer's income will make him a more valuable power and commodity customer. It has been determined that half the farmer's work time is sufficient to devote to the average farm. If industry can be attracted into the valley by cheap power, raw materials, and this available labor supply, a cycle for the benefit of all may be evolved: increased industrial and individual use of T.V.A.'s power with the resultant social benefits; increased income for the valley farmer ($45 a year is the average annual cash income in some of the mountain counties at the present time); and increased opportunity for private capital and the expansion of industry.

These are some of the factors which T.V.A. must consider in laying plans so that in the future there will be no conflict, duplication, or waste. All this is to be accomplished without compulsion or regimentation, for no specific powers have been granted the Authority beyond building and operating dams, selling power, and developing fertilizers.

Floods, with their destruction of life and property, their impairment of transportation facilities, and their waste of tremendous quantities of potential power, must be charged to the account of uncontrolled running water. The Tennessee Valley Authority was set up, in large part, to eliminate these wastes. In the past, floods in the valley are estimated to have caused an average annual loss of over $1,000,000. The completion of the carefully planned system of storage dams will completely do away with this menace. The downward rush of destructive water in times of flood will be held safely in check by a series of great storage dams built across the tributaries of the Tennessee, so designed that they can harness the greatest estimated surplus. Flood prevention will pay for dam construction over a long period of years.

In addition these dams will make navigable an inland water way that will

finally extend from New Orleans to Knoxville, Tennessee. Power, long a vital national issue, will be generated in these storage dams as well as in "run of the river dams," such as Wilson dam, which have practically no storage value. By this coordinated system, water can be stored to insure an adequate supply during dry seasons and can be used by every dam over which it passes. In this way the entire watershed will be joined into a super-power project that will produce many times the amount of power that a series of privately owned utilities would. Power is the life line upon which much of the success of T.V.A. depends. According to David E. Lilienthal, the third of the directors, the power policy has two major objectives: "setting up a measure of public operation of power as a 'yardstick'," and "a greatly increased use of electricity in the homes, the farms, and the factories." The recent eight-to-one decision of the Supreme Court has done much to strengthen T.V.A.'s position.

Of no less significance is the land program. As A. E. Morgan has stated: "land planning and land use are the basis of human economy." Lowdermilk in his article in the June, 1935, JOURNAL OF FORESTRY, "Civilization and Soil Erosion", states: "The great despoiler of civilizations and landscapes is soil erosion, by wind and water. It is a disease which has followed mankind throughout the centuries in his exploitation and destructive treatment of the good earth from which he received his sustenance—a disease difficult to discern at first and responsive to treatment in the early stages, but absolutely fatal to civilizations in its final stages." History and science support the statement. Erosion in our country has reached alarming proportions. The misuse of lands in the South has continued over so long a period that the erosion problem is more accentuated than in other parts of the country. Nowhere has erosion reflected itself in more miserable living conditions than in the valley of the Tennessee.

Briefly, T.V.A.'s program is first to classify the land and determine its best use, whether farm land, pasture, or forest. Efforts will then be made to build up the land and bring it into its proper usage by teaching, guiding, and ultimately, perhaps, distributing the farmers. If these efforts are successful, erosion will be checked, fertility returned to the soil, and poverty among the farmers largely eliminated.

Poverty and wealth, it would seem, are largely states of mind. In this valley, where for various reasons the inhabitants have fallen into a slovenly, hopeless frame of mind, their attitude is expressed in the miserable conditions of their living. Raise the people out of this apathy by education, by the enthusiasm born from a magnificent plan in the hands of a great leader, by opportunity created by a broader vision, and this same poverty-stricken valley may blossom into a happy, vigorous, hopeful community. Opportunity is usually existent if vision is present. Once let people see that there are better things ahead if they will make an effort, and the whole movement will gather momentum.

Aside from the economic hazards facing the enterprise, there are fundamental questions as to its social significance which merit close scrutiny. Is this socialism? Certainly the socialists have heralded T.V.A. as their own. Strictly speaking T.V.A. leans toward socialism, but is actually far from it. T.V.A., as the government, does not own the valley or the people in it. It merely cooperates with these people and advises them if they so desire. This system is far from the one of old rugged individualism, but when a system of individual effort leaves behind it shattered hopes and blighted opportunity, such as are now found in this valley, the necessity for some change is indicated.

A question has been raised as to the justification for using the funds of all the people to benefit those of a particular locality. The answer is that we are all one people and that what benefits one benefits all. Will the rest of the country gain by having a potentially rich section kept in poverty? Would France have been better off if Napoleon I had followed this policy and let the now prosperous Landes region remain a pestilence-stricken swamp threatened by encroaching sand dunes? The answer seems obvious. Sectionalism is a force that can disrupt the nation.

A more pertinent question raised is of a financial nature. Could not the great sums of money used in the attempted rehabilitation of the valley be put to better use by moving the present surplus population from this region to some other? Is the return from the money expended apt to justify the expense? The answer must lie in the degree of success expected of the T.V.A. If it is entirely successful the money will be amply repaid; if it is a failure the money will be largely lost. If this experiment proves a failure it may act as a means of avoiding greater and possibly disastrous failures on a national scale. Certainly the times indicate a searching for more abundant opportunities, and it seems the part of wisdom to try these proposed expedients on a small scale before plunging headlong into experimentation on a national basis.

On some sides fear is felt for the effect that T.V.A. will have on private industry. Might this step portend the destruction of all private industry by government competition? Here the government is certainly entering upon fields hitherto reserved for private enterprise. Have we as a nation reached a point where this intrusion is desirable, or even necessary? Again the answer must rest with the individual. Is this project as a whole a beacon of a fuller life to come or a dangerous precedent against the institutions we have so dearly won against the tyranny and selfishness of the past? The question is vital, and deserves and demands the careful, unprejudiced consideration of every thinking American.

Before this project can achieve its goal, serious hazards are involved that must be overcome. There is the danger that government work will not be done economically; that political patronage or graft will undermine its financial soundness; that speculators may be able to thwart the efforts of the Authority. There is the likelihood that this attempt will not prove to be in harmony with the trends of the times and that it will be condemned on the basis that it is unwise for the government to compete with private capital. Finally there is the possibility that in certain industries overproduction will result.

If successful, the work of the T.V.A. may prove an epoch-making event. It is the most ambitious effort any government has undertaken to improve a part of its domain. Where now the region is sparsely settled with poor, backward people barely able to exist, the land stripped and the entire area menaced by erosion, we may see a prosperous, fertile, thickly populated region of happy, forward-looking people. If the experiment is successful, the way will be pointed out by which other great sections of the country can, through such coordinated planning, be made to serve better the needs and desires of man. History may well be in the making in the valley of the Tennessee.

SCARS RESULTING FROM GLAZE ON WOODY STEMS

By H. J. LUTZ
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SEVERAL years ago I began to observe on stems in young hardwood stands the frequent occurrence of horizontal markings such as those illustrated in Figure 1. It was evident that the markings were rather strictly confined to the west, northwest, or north side, and in any given stand the orientation was remarkably consistent. Naturally the question arose as to the causal agency. Personal inquiry and search of the literature failed to supply an answer, so the phenomenon was investigated.

Observation of the condition in Pennsylvania, Connecticut, New Hampshire, Vermont, New York, and Michigan, together with examination of individual stems of known history, has led to the conclusion that markings are caused by glaze. During storms ice may freeze on the windward side of woody stems, forming a firmly clasping sheath 5.0 mm. thick or more. Thus uniform distribution of stresses resulting from bending may be prevented. When the stems are bent by the wind which commonly accompanies or follows the formation of glaze, horizontal cracks develop in the ice coating. Along the line of each crack the bark tissues are disrupted. Injury to the bark may result from tension or compression effects, or from cutting action of either the ice edges or jagged, sharp fragments of ice along the lines of fracture.

During the winters of both 1934 and 1935 lesions were observed to develop on stems of young trees at the points of fracture in the ice crust. The lesions are superficial, but sufficient to stimulate a notable production of cork tissue. At the time of inception they appear as fine lines having a vertical height of about 0.25 to 0.5 mm. but as cork tissue develops in subsequent years prominent scars about 2.0 to 4.0 mm. in vertical width result. The scars are raised 1.0 to 2.0 mm. above the bark surface and generally extend from one-quarter to one-half way around the circumference of the stem. In a few cases two distinct sets of lesions, formed in different years, have been noted on the same tree.

The injury develops most commonly on stems or branches 2.5 cm. or less in diameter. The scars persist for a number of years (at least 15) on trees whose bark does not slough rapidly or develop pronounced roughness. Very plain markings have been noted on specimens of *Quercus borealis maxima* (Marshall) Ashe, as large as 18 cm. in diameter, and on *Acer rubrum* Linnaeus stems 25 cm. in diameter. The lowest point at which scars appear on stems in southern New England is 45 to 75 cm. above the ground.

Stands in situations exposed to west, northwest, or north winds seem to be most affected. Scars have been noted on the following species: *Acer rubrum* Linnaeus, *A. saccharum* Marshall, *Carpinus caroliniana* Walter, *Cornus florida* Linnaeus, *Populus grandidentata* Michaux, *Quercus montana* Willdenow, *Q. borealis maxima* (Marshall) Ashe, *Prunus serotina* Ehrhart, *Fraxinus americana* Linnaeus, *Hicoria glabra* (Miller) Sweet, *H. cordiformis* (Wangenheim) Britton, and *Fagus grandifolia* Ehrhart. The regions which seem most subject to glaze storms, and in which injury of the type described may be expected, are characterized by strong cyclonic storms which bring precipitation and highly variable temperatures; eastern North America seems particularly susceptible.

So far as is known to the writer the lesions do not lead to serious consequences. No evidence has been obtained to indicate that they serve as points of entry for either insects or fungi.

Fig. 1.—Scars caused by glaze. A and B, *Betula lenta*, injured side and reverse; C and D, *Acer rubrum*, injured side and reverse. Size ¾ natural size.

Fig. 2.—Scars caused by glaze. E. and F, *Carpinus caroliniana*, injured side and reverse; G, *Quercus montana*; H and I, *Hicoria glabra*, injured side and reverse. *Quercus montana* is 1/3 natural size; all others ¾.

THE WHITE MOUNTAIN NATIONAL FOREST AS AN EXAMPLE OF MULTIPLE USE MANAGEMENT[1]

By R. M. EVANS

U. S. Forest Service

THE Weeks Law, as you remember, was based primarily on the theory of watershed protection, with timber management as an adjunct objective. It provided that only those lands were to be acquired that might, by the fact of their forest cover or denudation, influence the flow of navigable streams; but it also provided that when such lands had been acquired, they were to be held and administered as National Forest lands, subject to the laws and regulations affecting National Forests.

It was feared by some, even here in New Hampshire, that Forest Service management or any other single management of an area comprising from 700,000 to 1,000,000 acres, might lead to inescapable conflicts of both public and private interests.

Did the government intend to lock up the timber resources and devote its attention solely to stream control? Were the forests to be "preserved" for all time against any proper commercial use of their products? Or, would intensive timber management preclude the use of this area for the development of recreation, wildlife, and sport? What would towns from which all of these taxable lands were to be taken do for income?

I should like to attempt to answer these questions briefly, using the White Mountain National Forest as an example. What I shall say applies in principle equally well to any National Forest.

In determining the fundamental administrative policies of the White Mountain National Forest, two important factors were encountered. Many local communities are dependent to a large extent upon this Forest for wood—the raw material of many plants, both large and small, which go to make up the principal local industry. Also, many local residents are wholly or partially dependent upon forest resources and woods labor for their income and living. On the other hand, in many sections of the White Mountains standing timber is one of the grand scenic attractions that induces millions of people to visit the Forest each year. The business of satisfying the needs of these millions of vacationists has grown to be one of the state's most profitable sources of revenue, reaching in 1935, according to the State Planning Board, the impressive total of $75,000,000, of which about $18,000,000 is estimated to come from the mountain region.

With these two factors in mind, the major objective of this National Forest, as we see it, is to assure the permanent year-round prosperity of both industrial and recreational communities in northern New Hampshire through the conservation and distribution of natural resources, considered both from the utilitarian and from the aesthetic points of view.

It early became evident that this reconciliation of two such divergent points of view, the utilitarian and the aesthetic, could be accomplished only by careful long-range planning.

In the application of the broad objective, the Forest has been classified into:

[1]Address before the Silver Jubilee in observance of the passage of the Weeks Law, held at Bretton Woods, N. H., September 13-15, 1936.

(1), areas in which recreation is considered dominant in use and importance; (2), areas in which recreation is considered coordinate; and (3), areas in which recreation is considered subordinate.

In areas classed as dominant for recreation, the *discriminate* utilization of *all* forest resources is contemplated, provided such utilization can be accomplished without impairing recreational values. In this classification are placed high mountain peaks and ridges which are to be preserved in a condition as close to the natural as possible; strips of land along state highways and recreational roads; selected areas of virgin timber, as examples of undisturbed wild conditions; slopes providing the setting for ponds, lakes, and forest camps; and various other areas having similarly high recreational values.

In some sections of the Forest the scenic values are not the most important resource to consider, but there do exist real qualities of the landscape that bring enjoyment to visitors and residents in that vicinity. In such sections, the affection for and appreciation of White Mountain scenery are deeply personal and genuinely sustained. The recreational values of these areas are considered coordinately with other forest resources.

In areas possessing none of the qualities mentioned, recreation is subordinate to other forest uses. Here, only the strips along hiking trails and streams are reserved.

Let me cite a practical application of this system of classification.

In the northern part of this Forest there are two north-flowing tributaries of the Androscoggin River, the Peabody and Wild Rivers, each draining watersheds of approximately the same size. The valley of Peabody River comprises the northern section of popular Pinkham Notch, and is traversed by a heavily used state highway. It lies directly east of Mount Washington and the northern peaks of the Presidential Range. It is within one of the most popular and heavily used recreation sections of the White Mountains, and has been developed accordingly. It is classed as dominant in recreational value. But in spite of all this, harvesting of timber for local and other uses has been in progress for many years without material comment from recreationists.

The adjacent Wild River Valley is traversed by a dead-end road and has limited recreation use, which is confined chiefly to hunters and fishermen. It is classed as subordinate in recreational value, and extensive timber sales and timber-cultural operations have been and are being conducted, without regard to recreation except to screen road- and trail-sides.

These two valleys are being administered with two different objectives in mind, but in neither case does the achievement of the major objective interfere with the minor.

Now, what specifically has been accomplished in the twenty-two years since the federal government acquired title to the first tract of land in the White Mountains?

Assuming that I appear here as General Manager of this great public property, reporting to you, the stockholders, I might present a trial balance somewhat as follows:

Costs to the federal government:	
Cost to date of land (709,413 acres) and timber	$5,440,000
Cost of physical improvements (roads, trails, buildings, telephone lines, campgrounds, etc.)	2,528,000
Cost of administration	556,000
Approximate total	$8,524,000
Costs to the states:	
709,413 acres removed from the tax rolls.	

And what have the federal government, the people of New Hampshire, and people elsewhere gotten for this large outlay?

They have the ownership of 709,413 acres of land, or will have as soon as title to the last few tracts passes to the govern-

ment. Of this area about 20 per cent is classed as noncommercial from the standpoint of timber production, due either to climatic and edaphic conditions or to location in areas of predominant recreational values. A considerable proportion of this noncommercial forest land, perhaps 15 per cent, lies above the upper limits of merchantable timber on the high slopes of the principal mountain ranges. Because of its key position at or near the sources of four important New England rivers, the zone of scrub growth and barren land above timber line is far from valueless. For the protection of watersheds of navigable streams this noncommercial land fulfills ideally the purpose of the Weeks Law under which it was purchased. Furthermore, its recreation value is unquestioned. The unique and striking scenic effects found at and above tree line have attracted thousands of vacationists for generations. Although yielding no direct financial return, its status as public land is logical, for no private citizen could afford to pay taxes on such nonproductive land.

A few areas growing merchantable timber, but of predominant recreational value, have been placed in the noncommercial class. Areas of this kind are found in the more scenic notches, such as Pinkham, Crawford, Franconia, Kinsman, Mad River, and Carter, the Great Gulf and Tuckerman Ravines, and in some other locations. The total area of merchantable timberland thus classified amounts to perhaps 5 or 6 per cent of the area of the Forest.

The remaining 80 per cent of the Forest, classed as commercial forest land, supports a stand of around 1,850,000,000 feet of timber. The present growth rate is estimated at 90 to 100 board feet per acre per year. When the present half-stocked stands reach their full productive capacity, upwards of 100,000,000 board feet will be available annually to help supply the raw-material needs of the 62 wood-using industries tributary to the National Forest. These industries, when operating at normal capacity, require upwards of 300,000,000 board feet of timber and employ more than 7,700 men annually. The advantages of a stable wood supply are obvious.

The present authorized annual cut is 25 million feet. Although this has not been equalled in any one year, the quantity cut in commercial sales since the Forest was placed under administration reaches the important total of more than 120,000,000 feet. The harvesting of this crop has provided needed employment to many hundreds of people.

When I was growing up in my native Fryeburg, just across the line in Maine, it was no uncommon thing to watch fires strung along the east slopes of the mountains burning for days on end. Marks of these early holocausts are still plain on Baldface and Paugus, in Kilkenny and Zealand. In contrast, during the five-year period 1931-1935 an annual average of four man-caused fires burned a similar average of five acres of National Forest land. May it be said to their credit that not a single one of these fires was due to the carelessness of the thousands of campers who use and enjoy the Forest each year.

The physical plant is undergoing steady expansion and improvement. More than 290 miles of roads and 950 miles of trails have been constructed or improved and are being maintained. Many of these make accessible areas of high recreation value not previously capable of enjoyment except by a few hardy hikers. Others make possible the ready marketing and utilization of timber, ripe for the ax. All contribute to the effective administration of the Forest.

For the benefit of the more than three millions of people who use the National Forest each year for recreation and sport, new campgrounds are being developed and old ones enlarged; ski trails and high

country shelters are being built; two lakes (Long Pond and Campton) have come into being; many miles of fishing streams have been improved; plans for improving and increasing wildlife populations, even to the planting of adequate food trees and shrubs, are being worked out jointly with the state. Recognizing the importance of recreational incomes to communities within and surrounding the Forest, the federal Forest Service is doing what it properly can to focus popular attention on the recreational opportunities available.

I might go on cataloging accomplishments of one kind or another, but I hope I have said enough to indicate that the federal government is getting some return for its investment and carrying charges in the form of protection of the headwaters of four important New England rivers, increased value of its property through timber growth, and in addition is performing a function of government in providing opportunities to its citizens for employment and recreation; that the state is compensated in large measure for the removal of the lands from the tax rolls through the protection of this vast property at no cost to itself, and through a system of federal management which provides a continuous supply of timber for the support of local industries, and facilities for recreation and sport which bring to the region ever-increasing numbers of people who contribute to the support of local communities and residents. Many of the returns from recreation, both to the federal government and to the states, are intangible, but they exist nevertheless. On the tangible side, the federal government has realized from all sources, but mostly from the sale of timber, $634,000 since 1915. Of this amount, the states of New Hampshire and Maine have received $158,588 under the act of May 23, 1908, which provides that 25 per cent of the gross receipts shall be returned to the states for schools and roads.

From the standpoint of the economic welfare of the resident population, a multiple use forest seems more beneficial than one devoted wholly to recreational use, which is seasonal and tends to attract a larger population of nonresident employment than the wood-using industries. For a quarter-century the varied use of the White Mountain National Forest has, I believe, proven advantageous to northern New Hampshire. During the summer, and parts of the winter seasons, many residents benefit financially from recreational use, and during the rest of the year employment is furnished by logging operations and milling enterprises, which in many cases are operated on a year-long basis.

The development of a lake, a forest camp, or a ski trail which receives wide popular acclaim is spectacular. It is a form of enterprise naturally attractive to an administrator. To plan for and administer the sale of timber is unspectacular, involves a certain amount of drudgery, and the results on the ground, though dictated by sound silviculture, for a time often offend the aesthetic sense. Nevertheless, the continuance of the policy of dedicating a substantial proportion of the White Mountain National Forest to the growing and harvesting of timber crops is advisable on account of the legal authority under which the area is being acquired, the direct financial returns accruing to the federal and town governments, the continuance of local industries, the encouragement of year-long resident employment, and the harmonious effect on recreational interests when carefully administered.

Single public management has, we believe, made possible the reconciliation of divergent interests and uses, and has avoided conflicts that multiple ownership and multiple management would likely have experienced.

THE HARVARD FOREST MODELS

By A. C. CLINE

Harvard Forest

SOME five years ago a generous friend of the Harvard Forest and the late Professor Richard T. Fisher, first director of the Forest, conceived a plan for a forestry museum to be erected near the present site of the Forest headquarters at Petersham, Mass. Its primary purpose was to be the education of the woodland owner and general public in central New England forestry, and the principal feature of its contents a set of small-scale models illustrating the history and silvicultural treatment of the local forests. The prospect of such a unique and eminently useful gift appealed deeply to Professor Fisher, the more so because of his strong belief in the value of visual aids to instruction, and he entered whole-heartedly into the exacting task of designing the models and instructing the artists in the minutiae of tree and stand structure. Members of the model-making firm of Guernsey and Pitman, of Cambridge, Mass., spent many days at the Forest making sketches, photographs, and notes to answer the scores of questions which arose in connection with the building of each model. Several months were required for a group of six artists to complete a single one. In all, sixteen have been constructed during the past four years, the first eight under the supervision of Professor Fisher, the remainder under that of the writer.

The complete set of twenty-four models will be composed of a historical series of seven models portraying the major steps in the land and forest history of the region, and a silviculture series of seventeen models dealing with such cultural treatments as planting, weeding, thinning, pruning, and reproduction cuttings. The historical series traces the changes in land use and vegetative cover which have taken place on the same piece of ground over a period of two hundred years. It begins with a model of the virgin forest, and ends with one of a cordwood-size hardwood stand which followed the cutting of "old-field" white pine. The models forming the silviculture series present a wide variety of soil and topography, all typical of the central New England region, and, in so far as possible, the composition, form, and density of the miniature stand and its appearance before and after treatment are based on actual cases and recorded observations. (see Figures 1 and 2).

It is believed that such a museum, devoted largely to forestry exhibits of a local nature and situated in the midst of a forest which provides within easy reach living examples of these, will contribute greatly towards a better appreciation and understanding of New England forests and forestry, and a quickened interest in the practical application of silviculture.

In connection with the Tercentenary Celebration of Harvard University the sixteen completed forest models were placed on temporary display at the University Museum on Oxford Street, Cambridge, where they will perhaps remain for some months. The staff of the Harvard Forest extends a most cordial invitation to the members of the Society of American Foresters and to the general public to visit the exhibit.

An illustrated brochure, entitled *The Harvard Forest Models,* may be obtained by those unable to visit the exhibits.

Fig. 1.—Model No. 4 of the Silvicultural Series showing the third thinning in a stand of mixed white pine and hardwoods 50 years old.

Fig. 2.—Model No. 7 in the Silvicultural Series showing artificial pruning of white pine to obtain clear lumber.

GATINEAU SCALE RATIO METER FOR USE WITH VERTICAL PHOTOGRAPHS IN DETERMINING SCALE AND RATIO

By F. R. WILCOX

Canadian International Paper Company

THE scale ratio meter is a simple measuring device designed essentially to facilitate the use of individual contact prints in the field as they are used by foresters and field engineers.

The first necessity in applying aerial photographs to map making is a knowledge of the ratio of distance between image points on the photograph and the corresponding distance between the actual objects on the ground, in other words, the scale of the photograph. The scales of different sets of photographs, different individual photographs, and even different sections of the same photograph may vary.

Much has been written on the theory of map preparation from aerial photographs. There are several accepted and standard map making procedures, each with numerous variations, all of which have been analyzed by various writers in current technical magazines (see article by F. R. Wilcox in *Forestry Chronicle*).

To the knowledge of the writer there has been little, if any, written material prepared which offers guidance and help to the field men attempting to put the photographs to practical use in the field after the map has been prepared.

The theory behind the most used method (radial line) of producing an aerial map provides for a constant scale being adopted for all photographs in any one flight, or section of flight, between controls. The scale so adopted originates from the first picture of the flight and should have as its origin ground control. Starting from this origin, the user of this method then carries this scale forward and applies it to all subsequent photographs in the flight until the next control is reached.

As the mapping operation proceeds over an area, each flight has a given scale which may differ from any other flight and the scale of all flights will undoubtedly differ from the scale of the final map. The various scales, of course, are brought to one common scale.

Finally when the finished map is delivered to the field man he has a plan which may look like Figure 1. This plan shows the planimetric and the principle point traverse.

To get the most out of any aerial map the contact prints must be used by the field men who are working with the map. The map of course, has a common scale throughout, but the contact prints, in which we are placing so much faith and with which we tell our field staff they can do wonders, contain a very peculiar conglomeration of scales.

Even though the photography was carried out with a combination of altitude and focal length of lens to produce, in theory, pictures at the scale of the final map, these same scales as they actually occur on the photograph are likely, and justifiably so, to vary 10 per cent. Then there is the question of tilt and configuration of the terrain which again adds to the worries of our contact print user.

When finally all the scale influencing factors have been analyzed, we find that our field man has a set of contact prints, any one print of which may contain planimentry, represented by several different scales, to say nothing of the scale discrepancies occurring on various prints.

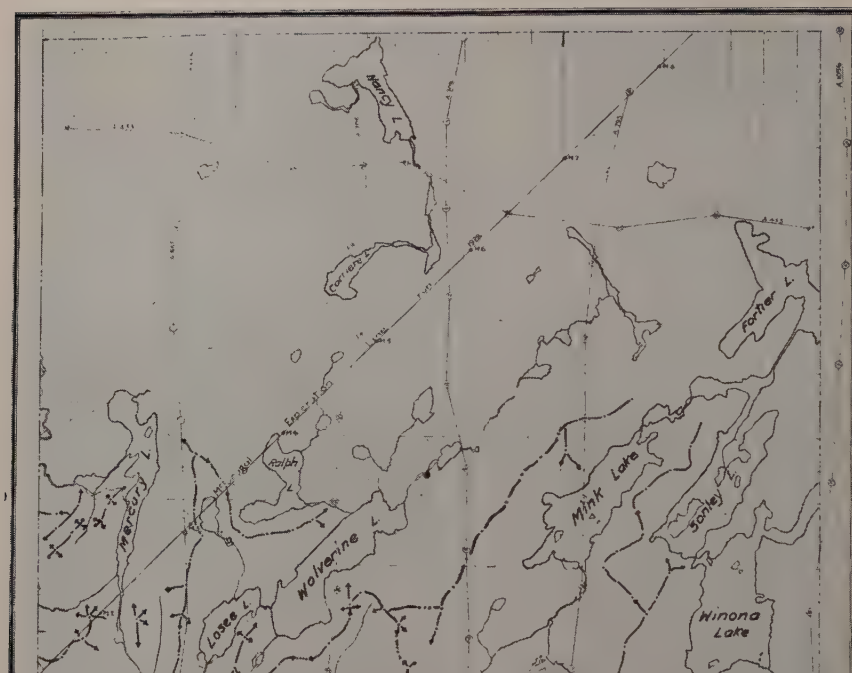

Quail L.
Carriere L.
Fortier L.
Mercury L.
Ralph L.
Wolverine L.
Mink Lake
Sonley
Losee L.
Winona Lake
Murphy L.
Wahwati Lake
Douaire Lake
Paish L.
Misty L.
Garvin L.
Damorion L.
Herbert L.
Taylor L.

Fig. 1.

Such scale differences are usually small, but may be large, and in all cases are troublesome to the field man.

In summarizing the scale situation we find that the most significant scale difference is that which occurs between the theoretic scale of the pictures and the scale of the final map, which is additionally confusing when it is borne in mind that, all other things being equal, there is likely to be an appreciable scale differential between any two contact prints due to change in altitude of the air stations.

So much for the cause; here is a remedy. The Gatineau scale ratio meter as shown in Figure 2 is printed on transparent celluloid, lumarith, or glass. The particular one shown has been developed for a base map scale of 20 chains to the inch. It is used:

1. To determine the scale of any contact print or section of print.

(a) *In relation to scale of map.*—Measure on the centre, horizontal, even 20-scale line the distance on the 4-inch map between any two features that may be readily identified on the photograph. Assume, for example, the distance so scaled to be 60 chains. Superimpose the scale ratio meter upon the contact print, making the centre horizontal line lay along the course to be measured. Unless the picture is exactly 20 chains to the inch, this distance will be found to be greater or less than 60 chains. Now slide the ratio meter up or down until it reads 60 chains between the two points. When this correspondence is established, follow the horizontal to the right hand margin and read the

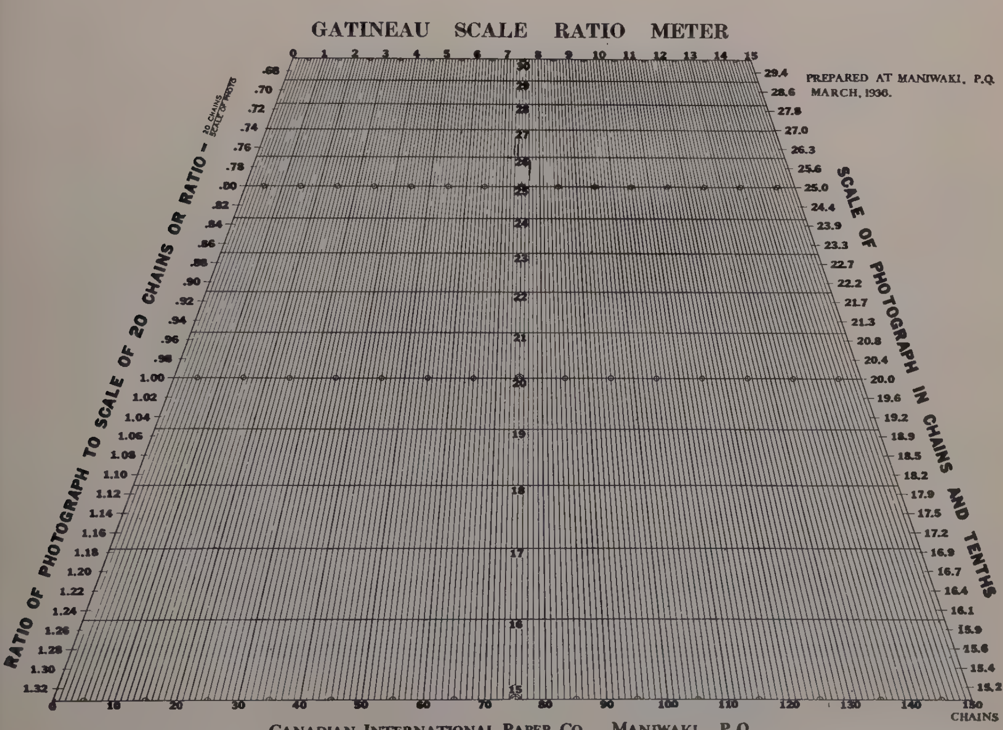


Fig. 2.—The Gatineau scale ratio meter is printed on clear celluloid, glass, or lumarith. This one has been developed for a base map with a scale of 20 chains to the inch.

scale of the picture, in relation to the 4-inch base map, direct.

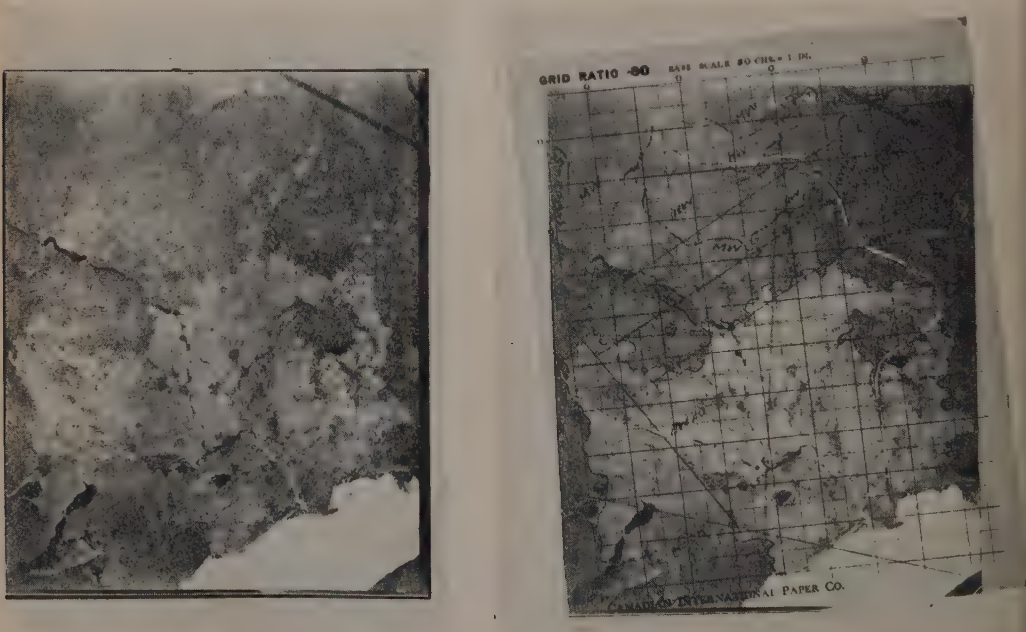
(b) *In relation to distance determined on the ground.*—The procedure is the same as above with the exception that the distance measured on the map is now measured on the ground. The measurement may be made by pacing, chaining, by stadia, by counting the revolutions of a buggy wheel, by motor car speedometer, or by guess, according to the accuracy desired. The resultant scale determined for the picture will be just as accurate as the ground measurement made.

2. To determine the ratio between the scale of the base map used and the scope of the contact print or section of print. The utilization of the scale ratio meter is two-fold. As mentioned above, the scale is read by following the horizontal line to the right. Follow the same line to the left and the percentic relation between the scale of the photograph and the scale of the map may be read direct.

This ratio is particularly valuable to the forester using photographs in the field, under office tent conditions that do not allow for the use of an optical projector for transferring picture information to the base map.

When pictures are used to facilitate cruising the most desirable procedure is to carry the contact prints in the field for the purpose of checking previous office interpretation and to identify cruise line ties as often as possible along the cruise line route. The same condition exists when running lines for the establishment and location of spot heights in contour work.

All such information must be transferred to the base map after each day's work. A practical and economical procedure for making this transfer is the employment of proportional grids. These grids consist of squares etched on celluloid or lumerath (Figure 3). For accu-



A B

Fig. 3.—Showing in (a) photo before it has been "typed" and interpreted, (b) same photo with grid superimposed and ready for transferring to base map.

racy of the order required for forest maps a grid for each .02 of ratio is found to be sufficient.

The procedure in using the ratio meter and also the grids in transferring picture information is as follows:

A cruise line has been run. It is desired to plot it on the contact print, complete the final picture interpretation, and transfer all this information to the base map. (By base map is meant a planimetric map of the main features as shown in Figure 1.) In plotting the cruise line one determines the scale of the line location on the picture by using the scale ratio meter as described under Item 1-b. The same operation determines the ratio of the photograph. The corresponding grid for this ratio is then superimposed upon the photograph (Figure 3) and the detail is transferred to the base map by proportional squares. It will be noted from a study of Figure 1 that squares have been ruled on the base map for this purpose. This ruling is done in yellow and does not interfere with future cartographic work on the map.

The range of usefulness of the ratio meter can be extended 100 per cent in each direction by doubling all figures or reducing them by 50 per cent. However, if such a range is required constantly, it would be advisable to make the two additional projections.

The scale ratio meter is simply made. The particular one illustrated in Figure 2 was drafted at three times its desired final dimensions. This projection was then reduced by the wet plate process and finally printed upon celluloid or glass. One very useful model has been printed upon celluloid 1/20″ thick (about the thickness of the regular drafting-room triangle) and bevelled slits cut along the even chain scale lines so that the instrument can be used to mark scaled distances.

SPROUT GROUPS AND THEIR RELATION TO THE OAK FORESTS OF PENNSYLVANIA[1]

By A. C. McINTYRE

Pennsylvania State College

CONSIDERABLE data are available on the "sprout hardwood forests" of the eastern United States, more particularly of those types in which chestnut and the various species of oak dominate. These data have been compiled and arranged in various ways to show the sprouting capacity and growth rate of species. These data (1), (2), (3), (4), (5), (7), (8), (9), (10), show that sprout origin, such as size and age of stump, site, and inherent characteristics of the different species are of most importance in predicting growth and survival and the composition of any forest following logging. Data available do not show, however, the number and size of stems composing sprout groups and the relation of these groups to the stand as a whole on an age-site basis.

Data were collected during the progress of a growth and yield study of the oak forests of Pennsylvania and are average values for the 123 sample plots studied. Site classification is based on height attained at 50 years. A poor site includes site indices of 30 to 40, medium 50 to 60, and good 70 to 80 (6).

Growth Forms

In a young, normal, second-growth hardwood forest, five and often six growth forms may be found These are: seedlings, single seedling sprouts, multiple seedling sprouts, single sprouts, multiple sprouts, and root suckers.[2]

The term "single sprout" refers to but one stem arising from a stump. "Multiple sprouts" refers to two or more stems arising from one stump.

These various forms can be identified during the early years of the stand's development. As the stands become older, it is increasingly difficult to make positive identification. This is especially true of multiple seedling sprouts and multiple sprouts. The stump from which the sprouts arise decay and gradually disappear. In this study these two growth forms were considered as the same, and the term "sprout group" is used to differentiate them from the other growth forms. Thus a sprout group is two or more stems arising from a single stump regardless of its size.

Forest Composition

In Table 1 data are given showing the average percentage composition and occurrence of the five principal species of oaks encountered in a study of the oak forests of Pennsylvania. The data are based on 222 study plots, and show the relative importance of each species to the forest as a whole. These data are only for stems 3 inches or over d.b.h. and so do not include large numbers of smaller stems.

Sprout Occurrence

Second-growth oak forests are dominantly of sprout origin. Data show that

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[1]Publication authorized by the Director of the Pennsylvania Agricultural Experiment Station as Technical Paper No. 564.

[2]The term "growth form", "single seedling sprout", and "multiple seedling sprout" have been defined and used by Leffelman and Hawley (5). The terms "seedling" and "root sucker" are used according to the terminology compiled by a committee of the Society of American Foresters. Jour. For. 15: 91, 93.

TABLE 1

OAK SPECIES FOUND ON THE SAMPLE PLOTS ARRANGED IN ORDER OF NUMBER OF STEMS 3 INCHES AND OVER D.B.H. BASIS 222 SAMPLE PLOTS.

		Number trees	Basal area	Cu. ft. volume	Per cent of plots on which species occur
		Per acre			
White oak	*Quercus alba* L.	30.88	26.76	25.96	93.96
Chestnut oak	*Q. montana* W.	15.08	14.67	12.39	67.24
Red oak	*Q. borealis maxima* L.	12.93	19.96	22.19	75.86
Scarlet oak	*Q. coccinea* M.	12.58	15.06	17.51	81.03
Black oak	*Q. velutina* L.	9.06	12.89	13.14	79.31
Others		19.47	10.66	8.81	100.00

on all sites approximately 75 per cent of the stand originates from sprout groups. Mortality is very high during the first ten years following cutting, after which the number of stems per acre decreases more slowly.

Table 2 shows the number of sprouts surviving at varying ages for the five different oak species. As many as 142 sprouts have been observed growing from one stump one year after logging (9). The average number of stems composing a sprout group at one year of age is approximately seventeen.

This table, which includes all sprouts regardless of size, is essentially in agreement with Table 3, which is based on data including only stems 3 inches d.b.h. and over.

As the stands become older there is a gradual reduction in the number of sprout groups. This tendency toward survival of but a single sprout per stump varies with the species. Black and scarlet oaks show the least capacity for or tolerance of multiple sprouts or multiple seedling sprouts.

TABLE 2

AVERAGE NUMBER OF SPROUTS PER STUMP BY SPECIES FOUND AT DIFFERENT AGES AFTER CUTTING. DATA INCLUDE ALL SPROUTS REGARDLESS OF SIZE[1]

No. yrs. since cutting	Chestnut oak	White oak	Red oak	Black oak	Scarlet oak
	Number of sprouts per stump				
5	7.3	8.2	9.9	7.5	9.0
10	3.8	5.3	5.7	3.5	4.6
15	2.8	3.9	4.5	2.2	2.7
20	2.4	2.5	3.4	1.4	1.9
25	2.3	1.8	2.3	1.0	1.5
30	2.1	1.7	1.4	1.0	1.4
35	1.9	1.6	1.1	1.0	1.3
Basis, number stumps	780	191	123	29	271

[1]Table compiled from curves by R. A. Vogenberger (9).

This variation in the sprouting capacity of different species has been noted by others (1), (7), (8). Such variations are reflected in the resulting stand and more particularly in the number of sprout groups found on any unit area. In Table 3 this relationship is shown in terms of percentage of total stand. Data were computed by obtaining the mean of the sum of all individual plot values reduced to per cent.

The data show that chestnut oak has the greatest tendency toward sprout retention. Sprout-group stems of this species averaged 12.6 per cent of the total stand. That these sprouts have developed normally is shown by the fact that their basal area was 14.95 per cent of the total stand basal area for the species.

The scarlet and black oak sprout-group stems comprised in each case less than 2 per cent of the total stand by number. For all species, the sprout-group stems formed 28.29 per cent of the total stand, with 37.83 per cent of the total basal area.

SPROUT GROUPS AND TOTAL STAND

The effect of site and age on the development of sprout groups is shown in

Table 4. There is a tendency for the number of sprouts per group to decrease from poor to good sites and for their basal areas to increase. As the stands become older the number of sprout groups and stems making up a group decreases.

In Table 5 percentage values for the sprout groups are given by age and site classes in terms of total stand. These data show very clearly the relationship between sprout group and total stand. As the stands become older the number of sprouts occurring in groups of two or more and their basal area decrease. Data collected on five plots whose age exceeded 225 years showed no sprout groups. In the stands where these plots were laid out, no sprout groups could be found. The author has observed sprout groups whose age was estimated at over 200 years. Such groups are not common and it is believed that if data were available a continued gradual decrease in the number of sprout groups would be shown until at age 200 few if any sprout groups would be found. This is what might be anticipated, for it is apparent in a study of sprout groups that one or more of the individuals making up a group gradually lose their dominancy and are finally eliminated.

The average height of sprouts composing groups increases with age and their average height tends to exceed that of the stand. This tendency is apparently influenced by site. The data show that on poor sites sprout groups maintain their dominancy and it is believed that their average height exceeds that of the total stand at all ages. On medium sites the average height of the stand exceeds that of the sprout groups up to about sixty years, when the average height of the sprout groups tends to equal or exceed that of the total stand. On good sites a slightly longer time is required for the average height of sprout groups to equal or exceed that of the stand. Such a trend is more readily understood if the decrease in number of groups is observed. As average height increases the number of sprout groups decreases. Such decreases are caused by the death of intermediate or suppressed trees within groups, and their loss increases the average total height of the remaining stems. The maintenance of height growth would be required if the individuals making up the group were to survive.

Data were compiled to observe if there was any tendency for the average height of the groups to decrease as the number of stems making up the group increased. Table 6 presents these data for the medium site. As the number of sprouts per group decreases there is a tendency for their average height to increase.

Summary

Data are presented on the sprouting vigor and sprout retentive capacity of the five principal oak species found in the second-growth oak forests of Pennsylvania.

In young second-growth oak forests over 25 per cent of the total number of stems and their basal area is found in sprout groups. With increasing age the number of stems making up a sprout group and their basal area decreases.

Table 3

DATA SHOWING THE PERCENTAGE RELATIONSHIP BETWEEN SPECIES IN TERMS OF TOTAL STAND PER ACRE. BASIS 123 PLOTS

	Chestnut oak	White oak	Red oak	Scarlet oak	Black oak	Total
			Per cent			
Sprout groups	12.60	8.43	3.55	1.99	1.72	28.29
Basal area of sprout groups	14.95	9.54	7.51	2.95	2.88	37.83

TABLE 4

AVERAGE NUMBER OF SPROUTS IN SPROUT GROUPS AND THEIR BASAL AREA AT DIFFERENT AGES AND ON DIFFERENT SITES. BASIS 123 PLOTS

Age. Years	Av. no. trees per acre	Average basal area per acre. Sq. ft.	Av. ht. of stand. Feet	Number of sprouts per acre in sprout groups					Basal area of sprouts per acre in sprout groups					Av. ht. of sprout groups. Feet	Basis. No. of plots
				Number of sprouts in group					Number of sprouts in group						
				2	3	4	More than 4	Total	2	3	4	More than 4	Total		
							Poor site								
25	693	53	24	123	67	16	24	230	8.92	5.11	1.09	1.28	16.39	27	3
35	568	61	29	83	30	8	8	129	11.00	3.57	1.31	1.06	16.92	31	5
45	549	82	32	119	39	6	8	172	22.14	7.29	1.22	1.56	32.21	38	10
55	528	90	35	58	23	—	—	81	10.29	3.98	—	—	14.28	40	4
							Medium site								
25	745	71	36	179	88	23	5	295	16.82	8.51	2.63	0.46	27.95	36	4
35	560	89	44	150	54	3	11	218	27.93	9.81	0.53	2.69	40.96	43	9
45	524	96	49	110	35	10	5	160	23.66	7.72	3.69	1.48	36.56	49	28
55	443	106	53	60	21	2	6	89	16.47	4.61	0.41	1.27	22.76	50	14
65	348	126	56	47	23	2	1	73	19.62	8.61	5.68	0.38	29.18	61	14
75	250	144	59	23	2	—	—	25	16.79	1.01	—	—	17.80	66	4
85	267	169	61	29	4	8	—	41	34.36	1.80	8.67	—	44.83	69	3
95	247	170	63	24	3	—	—	27	17.33	1.32	—	—	18.83	68	4
							Good site								
35	473	94	58	100	37	6	6	149	23.90	8.15	1.98	0.59	34.62	52	5
45	358	112	66	73	16	5	—	93	29.75	7.56	1.86	—	39.17	61	8
55	327	143	72	59	13	4	3	79	33.45	9.52	2.90	1.13	47.00	69	8

More sprout groups are found on poor than on good sites.

Three new terms, "single sprout", "multiple sprout", and "sprout group", have been defined and used in clarifying discussion of growth forms.

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Table 5

RELATIONSHIP OF SPROUT GROUPS TO TOTAL STAND, ON AGE-SITE BASIS

Age. Years	Sprout-group percentage of total stand: Number of stems	Basal area	Average height
	Poor site		
25	33	31	112
35	23	28	108
45	31	39	118
55	15	16	113
	Medium size		
25	39	40	99
35	39	46	98
45	30	38	98
55	20	21	92
65	21	23	108
75	10	12	113
85	16	26	113
95	11	16	110
	Good site		
35	32	37	89
45	26	35	92
55	24	33	96

Table 6

AVERAGE HEIGHT OF SPROUTS IN GROUPS WITH VARYING NUMBERS OF STEMS

Age	Number of sprouts in group: 2	3	4	More than 4
Years	*Feet*	*Feet*	*Feet*	*Feet*
35	56	53	47	42
45	48	51	49	42
55	51	48	47	43
65	62	61	49	56
75	67	60	—	—
85	68	61	65	—
95	69	65	—	—

THE RELATION OF SOIL EROSION TO STREAM IMPROVEMENT AND FISH LIFE

By W. W. AITKEN

Iowa Conservation Commission

IN IOWA the character of the streams has gone through a series of changes, beginning with the first clearing of the hillsides for pasture and the breaking of the prairie sod for corn. Today the state presents a topography of denuded hillsides, heavily silted valleys, crumbling river banks, and shifting channels. The gradual change in the stream environment caused by erosion has brought about a corresponding change in the fish fauna. Where once abounded those types of fish that preferred cold, clear water, today are found forms that are able to live in warm, turbid, and oftentimes polluted streams.

The distribution of fish roughly divides the streams of Iowa into four groups. Their location is shown in Figure 1. Those of the first group are in the drainage area of the Upper Iowa, Turkey, Yellow, and Maquoketa Rivers and their tributaries. In this area are found the major share of our trout streams.

Trout require cool, clear water. In Iowa this is possible only where the area is heavily timbered, where little turbidity exists, and where the rainfall is checked enough to prevent sudden floods which periodically eliminate the fish life. The drainage basin of the upper Iowa River and nearly all of the Turkey River basin has more than 25 per cent of the soil eroded. The lower portion of the Turkey River watershed, lying in the south half of Clayton County, has more than 50 per cent eroded, and the river and its tributaries afford little trout environment.

In the area occupied by streams of the second group, less than 25 per cent of the original soil has been washed away. In this section of limestone ledges is found a large portion of the small-mouthed bass territory of the state. Even here, soil erosion has been sufficient to affect the life of some of the species of fish native in this territory. Chief among them is the gamey small-mouthed black bass. However, many of the native darters and minnows are still numerous, and mud-loving species do not increase to an alarming degree. Their natural food is not abundant, neither are their particular spawning areas available. Stream-improvement devices installed where erosion effects have been greatest quickly restore the streams to something approaching a suitable habitat for the native species.

The third area, occupied by the upper half of the Des Moines River basin, has suffered the least erosion of any part of the state, and the natural conditions in the streams have changed least. Here are found in abundance more species of fish native to Iowa than in any of the other three sections. Small-mouthed bass are more numerous than in the area lying to the east.

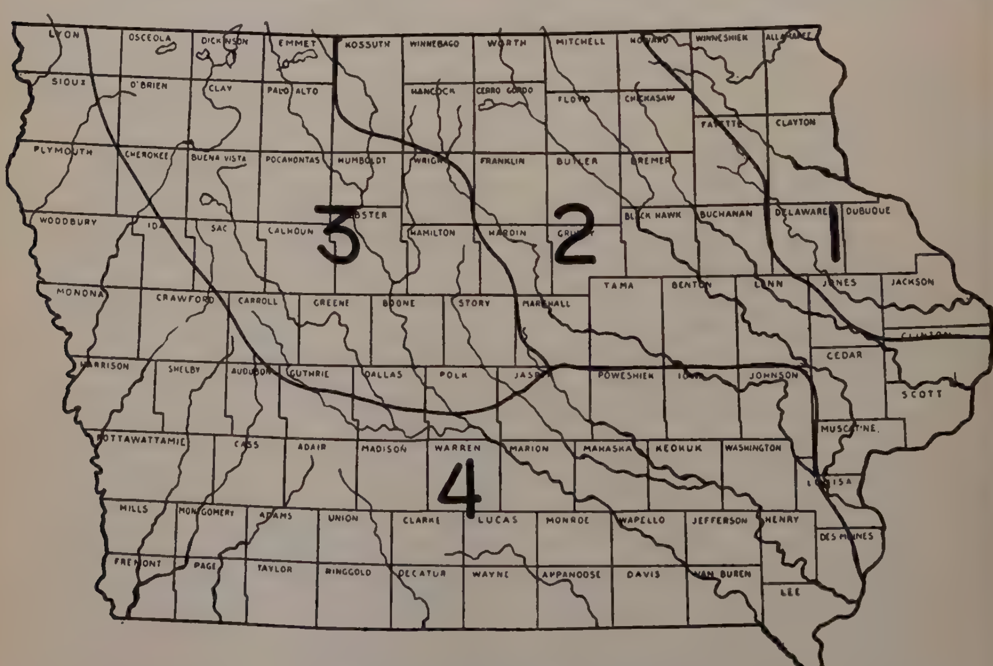
The streams of the fourth group flow through a section in which erosion has been very severe. In some places nearly 100 per cent of the original soil has eroded, and serious gullying is in evidence throughout. The fish found here are the species known as soft or rough fish—quillback, carp, gar, etc., and the mud-loving catfish. Muddy streams, silty bottoms, and wide stretches of warm, shallow water will naturally have forms that can live in such a habitat; these forms are a poor substitute for game fish. Au-

thentic records prove that this area once supported fish that are found in less eroded areas. Call, in 1887,[1] in a survey of the fishes of the Des Moines River basin, made comments on the abundance of certain species of fish that today cannot be found except with difficulty, even though these same species of fish have been replenished in the area in recent years by stocking.

The southwest portion of the state once enjoyed fair fishing in the Nishna, Nodaway, and other streams. However, the continued clearing of the loess hills and the straightening of the streams by drainage ditches to accelerate run-off hastened erosion, resulting in almost total elimination of fish life in this area. In fact, there are scarcely any fish except "runt" bullheads. Farther east, in southern Iowa, fish environment is little better, and then in only a few places on portions of the Grand and Chariton rivers, where erosion has been less severe. This entire fourth area comprises nearly one-half of the state.

Erosion control will improve for fishing a large portion of the state which has little or no fishing territory at this time. Good farming practices are directly correlated with fish management. If soil is saved by mechanical means and crop conserving methods, fisheries will be improved.

The citizens of Iowa and the federal government are fully aware of the seriousness of soil erosion throughout most of the state, and of the fact that if permitted to go on unchecked it will defeat good farming practices. A tremendous effort is being made to control soil erosion through C.C.C. camps, under the di-



Area No. 1.—25 per cent to 50 per cent erosion
Area No. 2.—25 per cent or less erosion
Area No. 3.—Little or no erosion
Area No. 4.—75 per cent or more erosion

Fig. 1.—Soil erosion in Iowa.

[1]Iowa Academy of Science.

rection of the Soil Conservation Service. The installation of control devices, the mechanical change of hill slopes by terracing, and tree planting are supplemented by a program of crop uses to save soil. Commendable efforts are being made to eliminate city and industrial wastes that pollute the streams. These measures will be a major influence for the improvement of fisheries. Stream improvement devices offer a further aid toward bringing streams back to a semblance of their former condition as a favorable environment for the more desirable species of fish. Without erosion control, however, these improvement devices are of little value, since they cannot eliminate turbidity, siltation, and other conditions resulting from erosion that are deleterious to fish life.

The wise management and conservation of Iowa soil will be a long step toward bringing about the return of the species of fish which originally flourished in the streams of Iowa.

Floating Test for Cone Viability

A STUDY now in progress at the Southern Station, U. S. Forest Service, indicates very strongly that cones of southern pines will open and free their seeds with difficulty, or not at all, unless they have matured sufficiently to float in water immediately after being picked from the tree.

BRIEFER ARTICLES AND NOTES

A Method of Studying Knot Formation

A new method of studying the formation of knots in trees, particularly conifers, was inaugurated at the Forest Products Laboratory. As a result, closer insight into the development and behavior of knots, from their inception until fully grown over, is obtained than is possible in the customary methods of investigating natural pruning of stands through occasional observation or in studies of knots as they occur in sawn lumber.

The method consists of sawing open the stems of second-growth trees in such a way that a longitudinal section of every knot, whether previously overgrown or not, is revealed (Figure 1). The tree trunk is first cut into billets 8 to 10 inches in length, care being taken so that all cross-cuts will fall between the branch whorls. These billets are then sawn radially on a band saw, the cuts being made to bisect all knots and knot scars visible on the outside of the stem; other cuts are made near the center at right angles to the radius in order to expose the presence of any knots that may have been completely overgrown. These knots likewise are bisected longitudinally and the material is then ready for making measurements.

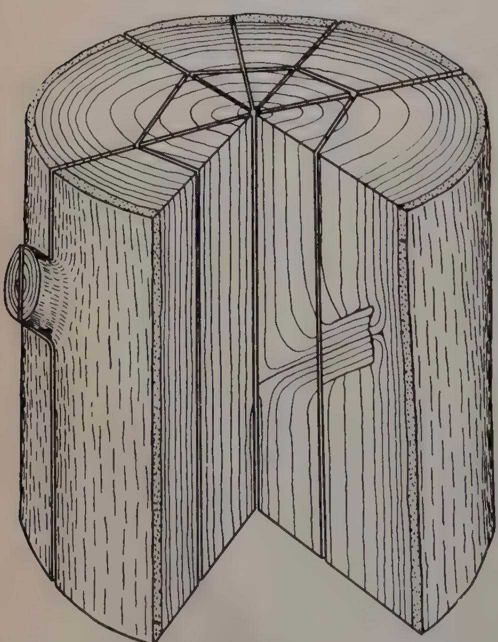


Fig. 1.—Method of cutting to locate and expose knots in trees.

In this way information on the distance between knot whorls, the number of knots per whorl, the size of knots at different heights, the size and age at which limbs died, the length of time it took the dead limbs to break off and heal over, the length of the dead portion of the knot, the number of years required for the grain to straighten out after growing over the dead stub, the prevalence of pitch around knots, and the rate of decay of the knots, can be determined from stands of merchantable size without the necessity of making observations and keeping records over a period of 25 years or more. In other words, the tree writes its own record over the years; what we do is to copy it and interpret it (Figure 2).

Furthermore, these findings can be correlated with rate of growth, both in diameter and height, release, suppression, stand composition, character of the soil, and climate. The tendencies of different species with respect to natural pruning and character of knots formed can be compared. The need of artificial pruning and the age at which such pruning

would be most desirable can be determined. The species which have been studied thus far are northern white pine, Norway pine, loblolly pine, and shortleaf pine.

The data already obtained show a great contrast in the shedding of branches and formation of knots between the species from the North and those from the South. In the North, white pine retains dead branches longer than Norway pine growing in the same stand. Close spacing of the trees apparently does not reduce the number of knots in white pine, and evidently any advantage from smaller side branches as a result of close spacing is offset by a reduction in the rate of growth of the trees and by the persistence of the dead branches, which result in encased or loose knots in the lumber. Although Norway pine sheds branches somewhat more readily than does white pine, in both of these species pruning at an early age seems to be essential if any appreciable volume of clear lumber is to be obtained from second-growth stands.

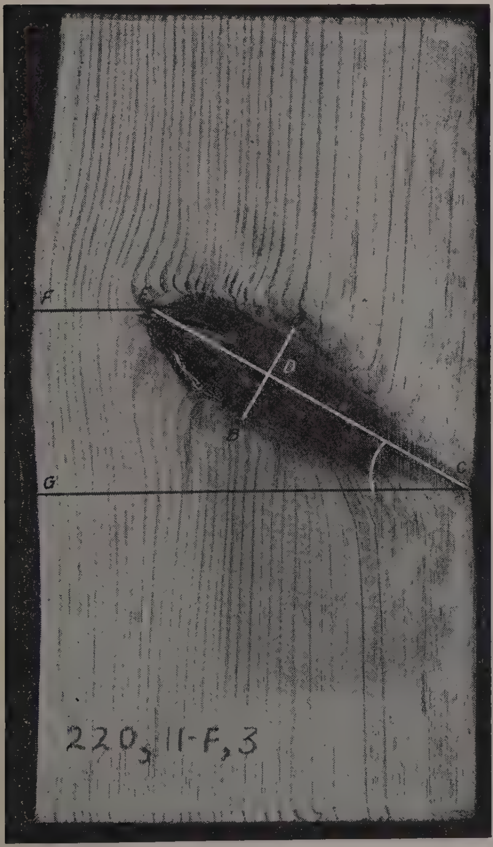


Fig. 2.—Knot in shortleaf pine illustrating method of measurement; *A-B*, diameter of knot; *C-D*, length of tight or live portion of knot; *D-E*, length of dead or encased portion of knot; *E-F*, thickness of clear wood; and *D-C-G*, angle of knot axis with the horizontal.

In the southern pines studied, dying and shedding of lateral branches progresses more rapidly than it does in the northern species. This condition may be caused partly by the inherent character of the species and partly by the climatic conditions which favor the decay of dead branches. The need of pruning is much less apparent in loblolly and shortleaf pine than in white pine and Norway pine, but undoubtedly it would prove advantageous in many understocked stands, especially if done when the trees are not more than 3 or 4 inches in diameter.

Arthur Koehler,
Forest Products Laboratory.

Further Comment on Seed Program

In the October Journal (pp. 954-55) Marlin H. Bruner comments on the previous articles by Dr. Shirley and myself. Specifically, he refers to the question of selecting trees within a stand for seed collection. There is certainly much to be said for preferring the seed of straight, healthy, well-formed trees to those of crooked and diseased specimens. Then one is on the safe side *if such defects should be hereditary.* However, it is well to point out that abnormalities of form in the mother tree due to accidents of growth or injuries received are quite certainly not transmitted to the offspring. Heavily weeviled white pines, or those which are forked and branchy because growing in

the open, cannot be suspected of producing seed of different genetic constitution. Since such trees are often remarkably good seed producers it seems unreasonable to refrain from collecting from them if seed from well-formed trees is scarce, or if it is unavailable because of lack of trees felled at the proper time.

A further point about collecting from tops and slash: in the writer's experience there is some danger of getting immature cones if one is not sure that the trees were felled after the seeds were ripe.

The important thing is to collect from indigenous stands in the region where the seed will be finally used in plantations. It is now becoming recognized that the genotype (inner genetic constitution) is the vitally important factor, and that this is often quite independent of the phenotype or external form in any one individual. Methods for differentiating groups of trees differing in internal makeup are now being perfected, and will be described in a future paper.

Henry I. Baldwin,
Hillsboro, N. H.

New Forestry Law in Venezuela[1]

On September 22, 1936, the Congress of the United States of Venezuela adopted a comprehensive forestry law which, if effectively administered, should go far toward insuring the conservation of the country's 100 million acres of forests.

This "Law of Forests and Waters" (*Ley de Bosques y Aguas*) applies to all forests and waters, whether in public or private ownership, within the Republic. It emphasizes particularly the relation between forests and water; the conservation of timber supplies, although one of its objectives, is subordinated to protection of water resources.

All forests are to be classified, on the basis of a cadastral survey, into four classes: (1) Those on the headwaters and along the margins of streams, lakes, reservoirs, and around springs, wells, or seeps; (2) those on slopes of more than 50 per cent; (3) those on slopes under 50 per cent; (4) those at a distance from water (presumably on flat land).

Forests of the first two classes, regardless of ownership, are considered protection forests. Specifically, these are forests in a zone 500 meters wide around the sources of any stream; 300 meters around springs on grazing land; 200 meters along margins of lakes and navigable streams; 100 meters along nonnavigable streams; 50 meters around any pond, spring, or well not included in the other groups; 500 meters on ridges and mountain tops that rise 500 meters above the surrounding plain; and all forests on slopes of more than 50 per cent.

Cutting, clearing land, and burning within these protection forests are prohibited, excepting cutting of not to exceed 10 per cent of the trees where they are overmature, diseased, or dead and should be removed for the good of the remaining stand. No land within these categories may be used for agriculture. Minor forest products may be extracted if their removal will not jeopardize the maintenance of forest cover. Grazing of sheep and goats within protection zones is forbidden, and no stock of any kind is permitted in the zones around stream sources or on steep slopes; in the other protective zones the numbers must be reduced gradually.

Unoccupied public lands outside the protection zones may be cut over, cleared, or burned over for agricultural use, under suitable regulations, after obtaining per-

[1]Based on text of law in *Gaceta Oficial de los Estados Unidos de Venezuela*, October 17, 1936.

mission from the proper authority, but not more than 5 hectares (12.5 acres) may be thus cleared by any one applicant.

No forest or other "high vegetation" (*vegetación alta*) may be destroyed without good reason, whether in a protection zone or not. The land-owner, or the concessionaire on public or private lands, is required to plant and care for trees around springs where the natural forests have been removed. A private owner must notify the forest authorities before cutting any timber; the forester is to examine the land and report to the Department of Agriculture, which can forbid the cutting if it is within a protection zone or will endanger the water resource, or if there is no other forest in the vicinity. An owner cutting timber is required to plant on his own land three trees of the same kind he cuts, or to conserve three saplings already there.

Exploitation of public forests outside of the protection zones is to be permitted, under suitable regulations, upon payment of an acreage license fee plus a royalty for the products actually cut. The area to be allotted to any one person or corporation is limited, and in case of competition for any area the concession is to be given to the applicant who seems likely to do the best job. Concessions may not be granted for more than three years at one time.

No natural vegetable product from public or private land may be transported without an official certificate showing that it is of legitimate origin. In order to conserve timber, the federal government and the states and municipalities are to encourage the substitution of coal, petroleum, alcohol, gas, and electricity for cooking, heating, and industrial power, and stoves for these fuels are to be admitted free of duty.

Administration of the law is to be in the hands of a special Service of Forests and Waters, to be set up within the Department of Agriculture and Stock-Raising (*Ministerio de Agricultura y Cría*).

W. N. Sparhawk,
U. S. Forest Service.

International Committee to Study Tree Seed Problems

At the final meeting of the Congress of the International Union of Forest Research Organizations, held September 8, 1936, at Lillafüred, Hungary, a new committee was appointed to study problems of tree seed control and the differentiation of local races. The Committee is composed of Prof. Dr. Werner Schmidt, Director of the Tree Seed Testing Station at Eberswalde, Germany, Chairman; Dr. Olli Heikinheimo, Director, Forest Experiment Station, Helsinki, Finland; Dr. Aldo Pavari, Director of the Royal Forest Experiment Station, Firenze, Italy; Dr. Gustav Vincent, Director, Forest Experiment Station, Brno, Czechoslovakia; Dr. Stanislaw Tyszkiewicz, Director of the Seed Testing Station of the Polish Forest Service, Warsaw, Poland; and the writer. Following the Congress some of the members of the Committee met at Eberswalde to consider plans for work.

The Committee was appointed in response to resolutions presented by Drs. Schmidt, Tyszkiewicz, and Delevoy (Belgium), and the purpose of the Committee and its program for work may be quoted from these proposals: . . . "The Forest Seed Commission shall study the question of diagnosis of provenance and racial types, and ordinary 'external' seed testing (germination and purity analysis) . . . Proposals and foundations for an inventory of local races in each country and for uniform methods of seed testing shall be reported to the next Congress" . . . (Schmidt) . . . "Agreement in the fundamental concept in forest tree seed work, and preparation of a terminology in dif-

ferent languages . . . Selection of methods for technical testing to be recommended for each species . . . Description of apparatus used at different stations . . . Maintenance of contact between different stations through exchange of seed samples, publications, and organizing of 'referee tests'" . . . (Tyszkiewicz) . . . "Collection and publication of the results after 25 years of the cooperative origin of seed experiment started in 1906" . . . (Delevoy).

An extensive short-time experiment is now being planned in an attempt to clear up the question of different strains of Scotch pine (*Pinus silvestris*). Samples of cones are to be secured from several origins in all countries where Scotch pine is indigenous. These samples are to be extracted under uniform conditions at Eberswalde, and the seed from each sample divided into about 10 parts. A number of different experiment stations will then be asked to test the seeds, sow them in the nursery, and make a few simple observations and dry-weight determinations on one-year seedlings. It is hoped that simultaneous experiments in a large variety of climates where this species is grown will provide valuable checks on the 1906 experiment as well. About 75 different origins will be tested, and results should be complete before the next Congress in Finland in 1939 or 1940. Sites for the nursery experiment in the United States and Canada are now being considered.

Since writing the above the following communication has been received from Professor Schmidt (writer's translation).

"In connection with the Congress in Hungary the work of the Commission was outlined in several communications. The necessity of a definition of tree races satisfactory from all viewpoints is apparent. Also it appears desirable to compare methods for the determination of inheritable racial characters. The following proposal is made in this connection. Then preliminary suggestions for comparative testing of the utilization value of seed will be made. . . .

"In order to determine if one-year-old descendants of Scotch pine and Norway spruce stands from different racial regions show their hereditary characteristics in the same way when planted in every climate, a collection of fresh pine and spruce cones of this year's harvest from different climatic provinces of each country is proposed. The cones can be extracted at the Seed Testing Station at Eberswalde. In the course of the winter seed samples will then be sent out to each experiment station which offers to make a test.

"According to the results of some stations, the size of the plants, their dry weight, weight of roots, weight of needles, etc., in one-year-old pine and spruce seedlings are characteristic for each climate race. It is only at a later age that trees from foreign origins suffer so that southern races fail in the north, etc. During the first years in all probability southern plants planted in seed beds in the north show a greater plant weight. There appears, however, to be a possibility of preparing a method for determining the most suitable origin for the region in question which would be of practical value for nurseries, and for great afforestation and reforestation projects, such as are now under way in China, North America, and elsewhere.

"It is suggested that about 10 to 20 forest experiment stations should receive a complete set of samples of the seed received by Eberswalde this winter, in order to carry out an experiment during 1937 on a small seed-bed area (about 10 m. x 20 m.) in a completely comparable manner.

"Laboratory methods can be compared relatively more easily and can be brought into agreement. Until now the basis for a comprehensive comparative field method has been lacking.

"At the moment it appears urgent that the collection of spruce cones, especially from different regions, be undertaken at the proper time, and that preparations be made to collect pine cones. From each climatic province from 3 to 4 hectoliters of cones will be necessary in order to send the seed samples later on to 10 or 20 stations. . . . In case the cones can be extracted in a government seed-extraction plant, the shipment of 1.5-2 kg. seed instead of cones from each origin would be simpler. In any case the collection of cones must take place from average autochonous stands in each climatic province, under continuous supervision of government forest officials."

At the same time a less comprehensive experiment with Douglas fir (*Pseudotsuga taxifolia*) is contemplated. This species is in great demand in Europe, where most of the member stations of the Union are located. Essentially the same technique will be used, except that the seed will have to be extracted at some point in the western United States near the place of collection. Other species will be considered if time allows and a sufficient demand is evinced. Meanwhile the committee will welcome inquiries and suggestions as to how it can best further the international exchange of seed of certified origin and safeguard reforestation projects from the use of seed of improper origin.

HENRY I. BALDWIN,
Hillsboro, N. H.

MISSISSIPPI FIRE FINDER

Because of a limited appropriation it became necessary for the Mississippi Forest Service to find some way to construct a cheap and at the same time accurate fire finder. This problem was solved by applying ideas found in use in several of our neighboring states.

The base of the fire finder is a 10-inch iron flange into the center of which is screwed a 2-inch iron pipe three feet long, which has been drilled about six inches from the top for a set screw. Inside the 2-inch pipe is inserted two feet of 1½-inch pipe, to allow the raising and lowering of the fire-finder table as desired.

On the upper end of the 1½-inch pipe is screwed a 4-inch flange, to which is bolted a 30-inch circle made of $^5/_4$ x 6-inch center match pine, which is glued together and battened with two pieces of 1 x 3-inch pine on either side of the center. A similar wooden upper circle is constructed, having only one batten on either side of the center, which fits between the two battens on the lower circle, thus allowing the top wooden circle to

Fig. 1.—The Mississippi fire finder.

slide between the parallel battens on the lower circle.

When set up in the tower, the fire finder should be so placed that the battens run East and West, thus allowing the finder to be shifted so as to eliminate the blind spots in the corners of the cabin.

A map of the area to be observed is glued on a 30-inch circular piece of tempered masonite, and on this a 30-inch azimuth circle 1½ inches wide is glued around the circumference. The whole surface is then shellacked. This map and azimuth mounted on masonite is held in place on the upper wooden circle by four brass clamps, which permit adjustments necessary to keep it always on true North.

In the center of the masonite circle is bored a small hole which serves as a pivot upon which a copper alidade rotates. This alidade is made of ½-inch bar copper 30 inches long; on one end is soldered a "feather end" and on the other a slot to be used as a sight through which smoke can be accurately located (Figure 1).

The total cost of materials for the construction of one of these fire finders is shown in Table 1.

TABLE 1

MATERIALS FOR MISSISSIPPI FIRE FINDER

Galvanized iron pipe, 2 pieces	$.84
36 inches, 2-inch pipe	
24 inches, 1½-inch pipe	
Cast iron flanges, 2	1.36
10-inch and 4-inch	
Alidade, ½-inch bar copper 30 inches long	.67
Pine lumber for base	1.29
Masonite	.90
Hardware, varnish, tape	1.78
Total	$6.84

A. K. DEXTER,
Mississippi Forest Service.

FOREST FIRE INSURANCE IN SWEDEN

The following abstract of a Swedish article[1] is illuminative of the progress that is being made in the Scandinavian countries in providing insurance against fire for the forests of these countries.

During the last ten years forest fire insurance has increased to include about 50 per cent of the insurable forest in Sweden, representing over 1,200,000,000 kr. ($400,000,000) distributed among 80,000 owners. With greater distribution of risk, premiums have been reduced so that the maximum annual rate for the most hazardous risk is not more than 0.75 per cent. In 1924 it was 1.20 per cent. In order to reduce premiums further and arrange for permanent insurance, the four principal companies have introduced perpetual or paid-up insurance. This is based on the assumption that under sustained yield management, as provided by present Swedish laws, forests will maintain a fairly constant age-class distribution. Young stands, the most valuable from the insurance standpoint, are protected by law against destructive exploitation. Under this form of insurance forests must be classified as "forests in general," i. e., a mixture of age classes. Fifty per cent of the value may be in young timber, and even 50 per cent of the area may be plantations. An innovation is the insurance of forest soil, not possible under temporary insurance.

In adopting the perpetual insurance plan, the owner is given the option of paying the premium all at once or over a period of years, at most 25, after which all payments cease.

Base premiums for perpetual insurance are calculated from the base annual premium for temporary (ordinary) insurance of 0.075 per cent, which is discounted as

[1]Trehn, I. D. All framtidsförsäkring—Paid-up insurance (Perpetuity insurance). A new form of forest fire insurance in force in Sweden beginning in 1936. Skogen 23 (3): 51, 1936 (Feb.).

follows: with single payment, 25 per cent discount; with payments distributed over periods of from 5 to 25 years, 20 per cent discount.

In the former case the base annual premium thus becomes 0.075 x 0.75, or 0.05625 per cent, and in the latter case 0.075 x 0.80, or 0.060 per cent—a considerable reduction. Bases for computation of premiums are fixed by law, using a 3 per cent interest rate. Thus, per 1000 kr. insurance, the base premiums for perpetual insurance would be as follows:

One payment, 19.31 kr.
Distributed over 5 years, 4.37 per year
Distributed over 10 years, 2.34 per year
Distributed over 15 years, 1.68 per year
Distributed over 20 years, 1.34 per year
Distributed over 25 years, 1.15 per year

The advantage of paid-up or perpetual insurance of forests lies in reducing the present relatively heavy costs of renewing the temporary insurance.

In Finland and Norway, where forest fire insurance has reached about the same development as in Sweden, about 50 per cent and 75 per cent, respectively, of insurance is in the paid-up form.

Abstracted by Henry I. Baldwin.

X-Ray Treatment of Tree Seeds

The electrical treatment of seeds has been the subject of much investigation. The claims of the Wolfryn Process (4) to increase yields of agricultural crops have been somewhat refuted by the work of Lauder (3) but still many physiologists hold that electrical effects are important in germination (5). Baines (1) believes that the seed substance must receive a continuous charge of electricity in order to remain viable. Recently much attention has been directed to the action of X-rays on seed, and an extensive literature has been accumulated. The effect of such radiation on the genetic makeup of many agricultural seed has been profound.

In order to observe whether similar effects could be observed in the case of forest tree seed, in 1931 the writer exposed a few samples of tree seed dry in paper packets, containing two ounces each, to approximately 100 kilo volts for exactly 4 minutes at a distance of 8 inches from the X-ray tube. The Snook apparatus transformer was used with no filtration. The spark gap was set at 6 inches, and the current read two milliamperes. Two weeks later the seeds, together with

Table 1

Average course of germination of X-rayed compared to control seeds each figure based on 2 x 100 seeds

Species	Treatment	Germination After 5 days	After 10 days	After 15 days	After 20 days	After 25 days	After 30 days
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Pinus strobus	X-rayed	0.0	0.5	5.0	13.0	17.0	19.5
	Control	0.0	0.0	4.5	10.5	15.0	17.0
Pinus silvestris	X-rayed	23.5	42.0	46.5	48.5	53.0	58.5
	Control	26.5	43.0	51.5	54.0	57.0	61.0
Picea rubra	X-rayed	1.0	42.0	66.0	69.0	70.5	70.5
	Control	1.0	46.0	73.0	76.5	77.0	77.0
Picea excelsa	X-rayed	15.0	75.5	79.5	80.5	80.5	80.5
	Control	34.5	82.0	84.0	84.5	84.5	84.5

untreated controls of the same lots of seed, were placed to germinate on the Jacobsen germinator. Germination was counted at 5-day intervals, and the seedlings were transferred to flats to grow. After 6 weeks' growth no differences could be observed. Unfortunately an accident prevented subsequent observations on the seedlings. The germination results shown in Table 1 indicate little influence of the treatment. In nearly every case a slight retardation of germination in the X-rayed samples can be observed. These results agree with those of Johnson (2) who has recently reviewed the work on X-ray stimulation and repeated many experiments reported elsewhere without finding any significant beneficial effects.

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1. Baines, H. E. 1921. Germination in its electrical aspect. E. P. Dutton & Co., New York, p. 185.
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3. Lauder. 1920. The electrical treatment of seed. Scottish Jour. Agr. 3: 340-344.
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Henry I. Baldwin,
Hillsboro, N. H.

Erratum

In the article entitled "Some Results of Thinnings in Small Pole Stands of Ponderosa Pine in the Southwest", Journal of Forestry 34:864 (September, 1936) the equation for the standard deviation was erroneously printed:

$$\sigma = \frac{\sqrt{\Sigma\,(X^2)}}{N-1}$$

instead of

$$\sigma = \sqrt{\frac{\Sigma(X^2)}{N-1}}$$

REVIEWS

Soil Erosion and Its Control. By Quincy Claude Ayres. *xi + 365 pp. 235 figs. McGraw-Hill Book Co., New York. 1936. Price $3.50.*

One might infer from the title of this book that all phases of soil conservation are given equal attention and treatment in this volume. It is found upon examination that the field of engineering is covered in considerably more detail than the agronomic and forestry phases of erosion control. As the author states in the preface: "If it should appear that disproportionate emphasis is accorded to engineering phases of control, the fault is not due altogether to the author's training and experience in that field, but also is partly attributable to the fact that more information of a practical and time-tested nature seems to be available."

Nine of the fourteen chapters are devoted almost entirely to engineering phases of erosion control. Three chapters relate principally to the significance of erosion, to factors affecting rate of erosion, and to soil conservation and land use in general. Two chapters are devoted largely to vegetative and forestry methods of control. The subject of wind erosion is only briefly referred to in the introductory chapter, and there is no detailed description of methods for its control. Attention is called to the foregoing facts not in a spirit of criticism, but to answer one of the first questions that generally arises in the mind of the average person when a new book appears on the market—Does it contain information in the particular field in which I am interested?

In the third chapter, entitled "Methods of Control", a somewhat detailed and well-illustrated discussion is presented on strip cropping, and the subjects of crop rotations, contour farming, and permanent pastures are treated rather briefly from the standpoint of their practical application to erosion control. The closing paragraph of this chapter emphasizes the need for the combined ingenuity of botanists, agronomists, foresters, soil specialists, engineers, economists, and sociologists in prescribing the best practices for erosion control.

Chapter 4, "Rainfall and Run-off", presents the latest available information on rainfall intensities and frequencies, together with maps giving amounts of rainfall for 5, 10, 15, 30, 60, and 120, minutes' duration and for frequencies of 5, 10, and 50 years. The application of these data in estimating the rates of run-off from any particular watershed is explained and demonstrated by means of practical problems.

Terrace design is quite fully discussed in chapter 5, with data on terrace spacings, grades, and cross-sections, taken largely from the results of experiments at the cooperative federal and state soil-erosion experiment stations.

In chapter 6, "Terrace Location—Principles and Practice", the subject of planning terrace systems is rather briefly discussed and surveying procedure is discussed in some detail.

Chapter 7, "Terrace Construction Methods and Machinery", is profusely illustrated with views of nearly all kinds of instruments and graders that are commonly employed. Several helpful illus-

trations particularly valuable to the novice are included, showing the actual steps by rounds with different kinds, of machinery in the building of terraces from both sides and from the upper side only.

Considerable information on cost of terracing is included in chapter 8. The author realizes that these cost data suffer from a lack of information relating to the numerous factors that influence the cost of terrace construction. As he says, "No true and complete comparison of cost data is possible unless each of these factors is fully known and evaluated, but since no two have precisely the same weight and some are much more influential than others, comparisons close enough for practical purposes may be had when approximate conditions are given." Terrace cultivation and maintenance are described, but not much information is presented as to the difficulties of cultivating terraced lands in regions where different types of large farm machinery are used. Nor is any reference made to the subject of laying out or maintaining orchards on terraced land. The important subject of properly terracing old orchards with trees in straight rows is not treated anywhere in this volume.

Chapter 9 is devoted to a discussion of terrace outlets. There is considerable difference of opinion as to this; for instance, some would differ with the author as to the superiority of woodlands to pasture for terrace outlets. Also the velocity of water that various kinds of vegetation would withstand without serious erosion and injury to the outlet channel is a moot question, but it is believed that the author is justified in playing safe by recommending comparatively low velocities for outlet channels until further experimental data on this subject become available.

General principles relating to the design of structures for the control of gullies are discussed in chapter 10, and chapter 11 discusses temporary or semipermanent check dams, which are quite commonly built by farmers. Permanent check dams built of masonry and reinforced concrete and large soil-saving earth dams are described in chapter 12. Few cost data are presented in these chapters on gully control. Comparative cost records of the various methods would indeed be valuable to one responsible for directing an economic program for the control of gullies.

The use of vegetation for gully control, and stream-bank protection by vegetative and engineering methods, are discussed in chapter 13. The first part of this chapter, dealing with the use of trees, shrubs, vines, and grasses, is based largely upon instructions issued to emergency conservation technicians by the U. S. Forest Service. The author introduces this chapter with the statement that "the ultimate purpose of building most check dams is to make possible the restoration of natural control through the growth of vegetation." The grasses and shrubs mentioned in this chapter as being effective in gully control work are supplemented by an additional list in the appendix.

The last chapter is devoted to a discussion of soil conservation and land-use programs, including experimental and demonstration program of the Soil Conservation Service and brief observations on the economic phases of erosion control.

This volume represents a compilation of a large amount of experimental data and other material that have been collected principally by state and federal agencies over a long period of years. The bringing together of this scattered information in one concise volume makes available for ready reference the answer to a multitude of problems met with in soil conservation activities, and is especially valuable in serving the immediate needs of apprentices and others with little experience in soil conservation work.

In connection with the huge program

of research and demonstration being conducted by the Soil Conservation Service, improvements are rapidly being developed which in many instances reveal the inadequacy of certain established practices, particularly in regions where the beginning of erosion control is comparatively recent. For instance, methods that are perfectly satisfactory in one region are not always adapted to other regions, owing to differences in agricultural and climatic conditions. Needless to say, it is impossible to keep pace with this rapid progress, particularly in the publication of books that require a great deal of time in their preparation.

A volume of this size must of necessity be more or less general in its recommendations. Many of the basic principles of erosion control, particularly of engineering, are almost universally applicable, but the many special problems that are encountered in various regions of the United States require special treatment and solution, such as in the irrigated citrus orchards of California, the tobacco lands of Virginia and neighboring states, the steep lands of the Palouse region in Idaho and Washington, the semi-arid range lands of the Southwest, and the sandy orchard lands of New Jersey and other coastal plain states.

C. E. Ramser,
Soil Conservation Service.

Our Friends the Trees. By P. G. Cross. *334 pp. Illustrated. E. P. Dutton & Co., New York. 1936. Price $5.*

"Forestry has to do with trees in their relationship to forests, their care and culture. That is good so far as it goes, but it does not go far enough. We must give full consideration to trees in their relationship to human habitations. Tree conservation is home preservation." In these words Dr. Cross expresses the keynote of his book, which is written in a very readable style and should be very helpful to people who want to use trees and shrubs to make their habitations more homelike and attractive.

The book contains many interesting facts about trees and a great deal of information, based on the author's own experience, regarding the selection of trees for various climates and soils, and methods of planting and caring for shade and ornamental trees.

It probably will not make much difference to the average reader that many of the Latin names of the trees are misspelled, or even that some of them are rather fantastic—for instance: *Balsamea mecanensis* for Balm of Gilead (p. 217); or *Cedrus lawsoniana* for Port Orford cedar (p. 127); or the listing of *Casuarina* among the oaks (p. 121) and holly among the ericaceous trees (pp. 141, 204, 307). More startling is some of the botanical information, for example: the statement (pp. 38-39) that the cambium is a colorless liquid which circulates through the tree in a similar manner to blood in animals; that the Norway maple (p. 233) will bleed to death when its "milk-like juice, the cambium, escapes through a broken branch or bole"; and that the South American laurel yields "a peculiar liquid, the cambium flow, which is of an inflammable nature" (p. 211). It is also somewhat surprising to read in a book by a resident of North Carolina that American turpentine is obtained mainly from the loblolly pine (*Pinus taeda*) and the longleaf pine (p. 211). One may also wonder why bald cypress is recommended for planting on hillsides and ridges but not on bottomlands (p. 259).

In his enthusiasm for living trees the author has little patience for commercial use of the timber: "Lumbermen's associations exist as organized enemies of trees" (p. 269); and falls into the common error of considering the use of evergreens to give Christmas cheer as "tree murder" and

"wanton, mercenary slaughter of millions of noble evergreen trees," contrary to the spirit of Christ (p. 295). The assertion is made (p. 209) that "a heavily wooded area larger than the whole state of New York was burned to the ground in the United States in one single year. Never a year but more than 50,000,000 acres in forests are completely destroyed by fire in the United States of America". This is perhaps pardonable hyperbole.

On the whole, however, the author's purpose is not the negative one of scolding the miscreants, but rather the positive one of arousing widespread interest in trees among the people at large. His book should help to convince many readers that trees are indeed friends of mankind.

W. N. SPARHAWK,
U. S. Forest Service.

A Survey of the Pastures of Australia. By A. McTaggart. *Council for Scientific and Industrial Research Bull. 99. 71 pp., 10 pl., map. Melbourne, 1936.*

This bulletin is of interest to all concerned with grazing, especially since it was issued at about the same time as the report on the western range[1] in this country.

Much of the Australian pasture land, using the term in its broad sense, approximates that of our West and Southwest. One-third of Australia receives under 10 inches of rainfall per annum, and another one-third between 10 and 20 inches. In comparison, the United States, with a slightly greater total area, has less than 15 per cent of its area in the 0 to 10 inches precipitation zone. Therefore range forage plants in the drier areas are of even more importance in Australia than in this country. The large map, colored to show the pasture classification, is enclosed in a pocket in the back of the bulletin.

The text describes the zones, from the seaboard rim with high precipitation to the interior basin with low and intermittent annual rainfall. A section entitled "General Review" gives a brief description of the zones and their interrelationship, based on vegetative climax types. The "Detailed Survey" describes them in fuller botanical detail, giving dominant and subdominant tree and pasture plants in each. Differences due to soil, topography, elevation, rainfall, and edaphic conditions are noted.

The pasture lands are classified into 14 major and two secondary zones. Grazing is associated with forest growth in the tropical and southern open-forest grazing areas, and in the close-forest grazing areas of the north and south. The trees in these four zones are mainly eucalypts. Many of the grasses bear familiar names, others are being used experimentally in this country. Genera now growing in both countries include: *Eragrostis, Danthonia, Paspalum, Sporobolus, Poa, Aristida, Stipa, Agropyron, and Dactylis.*

The rain forests include two zones, but they are too dense to be grazed until they have been cleared. Other zones are alpine pasture and open grasslands (northern and southern) which have many familiar grass genera. The acacia scrub, mallee scrub, and saltbush types have recognizable counterparts in our western manzanita and southwestern scrub and salt desert types. In the mulga type, which separates the region of summer rainfall from that of definite winter rainfall (both 10 inches), *Acacia* spp. and ephemeral grasses and herbs are dominant. A large part of the spinifex (*Triodia* spp.) type

[1]The western range a great but neglected natural resource. Sen. Doc. 199, (74th Congress, 2d session) 1936.

on desert sandhill country has good grazing only a part of the year.

The bibliography is subdivided by states. Many of the photographs show types similar to parts of our forest and range associations.

R. S. Campbell,
U. S. Forest Service.

Blister Rust Control Manual for Field Men. (Northeastern States). Compiled by C. C. Perry. *82 pp. (Mimeographed.) Illustrated. Division of Plant Disease Control, U. S. Dept. Agriculture. 1936.*

This pocket-size compilation of facts that blister rust field men should know is the fifth revised reprint of a handbook that originally was prepared for the use of personnel in Massachusetts. The present edition is designed for the workers in all the northeastern states.

As every forester knows, blister rust is a disease of the white pines. It is not so well known that the presence of blister rust within the natural range of these pines has created a protection problem secondary in importance only to fire. Blister rust, if permitted to spread unchecked, is positively fatal to white pine trees. But it can be controlled.

The war on this major tree disease has been waged systematically in the northeast since 1922. Although the fight has not been as spectacular and as widely publicized as the campaign against fire, the accomplishments have been no less remarkable and no less economically significant. "In the northeastern states as a whole, control of the rust had been established at the end of 1935 on about 81 per cent of the white pine area by the initial eradication of the *Ribes*. Over 19 per cent of this area has been worked a second time to keep the disease under control," says the author.

The publication of this manual serves, unintentionally, to focus attention on the achievements of the comparatively small body of blister rust workers—federal, state, and private—who have accomplished so much in such a brief period. It describes in simple language a workable technique of controlling a complex plant disease. It should prove of value to all forest workers.

Henry E. Clepper,
U. S. Forest Service.

Our Enemy the Termite. By Thomas Elliott Snyder. *xii + 196 pp. Illustrated. Comstock Publishing Co., Ithaca, New York. 1935. Price $3.*

In recent years damage by termites has received increasing attention throughout the United States. Numerous articles both popular and technical have been published, and one comprehensive report on the subject has appeared. But in spite of all the printed information now available concerning these insects, there has been a need for just such a book as "Our Enemy the Termite", by Thomas Elliott Snyder of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Dr. Snyder is recognized as an outstanding authority on this group of insects. Previous publications have either been too technical for the comprehension of the general public, or so condensed that they are incomplete, or in some cases superficial and inaccurate. Because of this lack of readily accessible and accurate information, the public has frequently suffered from the false claims of some unscrupulous and unreliable exterminator companies who often charge exorbitantly for worthless termite remedies.

Dr. Snyder's book strikes a happy medium between the highly technical and the popular. The information contained there-

in is accurate and complete enough for all practical purposes. In general the subject matter is well arranged, but some may feel that the presentation might have been improved by the omission of extraneous material and the adoption of a more direct style. Also, this valuable book might have been made still more useful by the addition of a section giving the more easily recognized characteristics of the more important termites. But these criticisms are of minor consequence in comparison with those features deserving of compliment.

The first chapter discusses the origin, relationships, and distribution of termites, and the following six chapters the biology of these insects, including metamorphosis, colonial organization and castes, the reproductive habits, development, food habits and requirements, and their symbiotic relationships with other organisms, both internal and external.

In chapter eight the different kinds of damage caused by termites are described in a very satisfactory manner, and in the next two chapters the control of termites is discussed. The tenth and last chapter is the strongest portion of the book, and in many ways is superior to anything else of the sort that thus far has been written about termites.

Following the main portion of the book are appended specifications for remedying termite damage to buildings, provisions that should be included in building codes, enumeration of world termites, a classified list of termites of the United States, and a glossary of technical terms used in the text.

This book is a real addition to termite literature and will be welcomed by economic entomologists, foresters, architects, and builders.

S. A. Graham,
University of Michigan.

CORRESPONDENCE

Stability of Animal Communities in Climax Areas

Editor, Journal:

In his article in the September issue of the Journal of Forestry, we find C. J. Buck questioning the ecological stability of the primitive forests of the Olympic Peninsula and the animal community associated with them, yet offering no explanation. It is generally conceded that the present forests of the Peninsula represent climax growth, and if this is true, they should, according to all known ecological principles, represent the most stable possible plant community that the area is capable of supporting under present climatic conditions. Ecological succession studies indicate that animal communities develop along with plant communities, and when the final stability of a climax growth is reached the animal community shares this stability.

On the Olympic Peninsula there is every reason to believe that the present fauna and flora have existed for a long period of time in an essentially unchanging state, as ecological principles would lead us to expect. If present conditions are to be radically altered by natural processes, a climatic change would be required that would be sufficient to alter the climax growth. So far as I am aware ecological research has not indicated the presence, under normal conditions, of any other factor that would upset the present stability of a climax association such as is found on the Olympic Peninsula.

For Mr. Buck to say "in this region, with its complex biological associations, some active, progressive form of management must be applied, else the very forces which have created will eventually destroy" would indicate that he has so long been associated with the activities of the Forest Service, where every effort is made to minimize and counteract the upsetting influence of man on natural areas, that he believes that even undisturbed nature needs the help of the Forest Service. Why this should suddenly be true after so many thousands of years is a little hard to understand. That land upon which man enters and removes products of value to him, or otherwise alters in order to make it furnish him a livelihood, must be intelligently managed if it is not to lose much of its value to him, has been demonstrated repeatedly in the history of this continent. That land untouched by any of man's activities must be managed if it is to retain its primitive natural condition, is a startling statement, particularly when that region is now in the stable period of climax associations.

Why Mr. Buck should bring up the elk to support his argument for management of the area is hard to understand, as ecologists recognize the problem of an overabundance of elk and deer as being a direct result of unwise interference with natural predation, that in primitive areas exercises a control on herbivorous species and prevents damage to plant species or starvation of the animals themselves. To quote Mr. Buck: "The cougar, the bear, the deer, and all the rest have their place; yet if any one species is allowed to dominate others will be lost." How does Mr. Buck suppose one is going to dominate unless man interferes? If any strong, inherent tendency to dominate had existed, it would have had a chance to exercise

itself long before this. Actually, the species now present can be presumed to be there because they did dominate competitors during the period of ecological succession, but today the species present are not so much competitors as essential links in a chain, or blocks in a structure that is inherently balanced and stable, but dependent on the presence of each native species for the future maintenance of that balance.

The greatest handicap under which ecologists and botanists who are trying to solve some of the present problems resulting from land misuse are laboring is the scarcity of areas that man has not disturbed, as only in these can some idea of the original plant and animal association be obtained. It is to these original climax communities of plants and animals that we must go to observe nature in a state of maximum stability, and it is toward the restoration of as close an approximation of these communities as is possible that we must go if we are to insure permanent productivity of the land on which man's continued tenure of it depends. Man's utilization of land involves a shift to different species, and here management is necessary, but a management that utilizes the same fundamental balancing factors that operate automatically in a primitive area.

Let us not be so short-sighted as to fail to profit from past mistakes, in not preserving a study area in undisturbed state in each great biotic region of the country. It is not yet too late to save a few, and far from being a luxury, it may be one of the wisest investments that the country has ever made—natural yardsticks to measure man's land management by.

RICHARD H. POUGH,
National Association of Audubon Societies.

Editor, JOURNAL:

The following comments on Mr. Pough's letter occur to me:

1. The National Park policy is one of protection of all game, predatory and otherwise. However, even should the park include all the land in the Olympic National Forest, the elk and cougar would not stay in the park the year around. The elk, particularly, would get winter range from state and private lands.

2. It has not been my conclusion, but rather is still a matter of consideration, as to whether the cougar should be eliminated, even though they are predatory. I am inclined to believe, just as I do about the timber wolf, that the cougar should not be eliminated from our United States fauna.

3. If a balance of nature has ever been attained in the past on the area, it has already been upset on the Olympic Peninsula by human interference. Should the area be used as a park or as a primitive area, its interference will become more and more. For instance, last summer it took sixty horses to move twenty-two people through the area. These horses reduced the food supply. If several thousand people should visit the area with horses, the interference with the forage would be considerable and affect the fauna.

4. The enclosed letter of November 4 from H. L. Shantz to Mr. Charles N. Webster, Port Angeles, Wash., is germane. As Dr. Shantz says: "Management is the best insurance we can give for the perpetuation of the species (elk). Sentiment played so great a part in the consideration of wildlife problems that it is difficult to realize that with the present disturbed balance of nature (which probably never was balanced, even when primitive man was in control), some other than control by nature is needed to correct the situation."

C. J. BUCK,
U. S. Forest Service.

Dr. Shantz's letter follows:

MY DEAR MR. WEBSTER:

Your good letter of October 15 and enclosed clippings are very much appreciated. Naturally, we are greatly interested in the future welfare of the Olympic Peninsula. The Forest Service has recently

established a separate division of Recreation, and I feel that the Service will continually increase the recreational facilities of these forests. Your comments on roads are especially noted.

With respect to the elk herd, I have always had a good deal of sympathy for the point of view expressed by Mr. Chris Morgenroth. However, after traveling over a large number of game ranges in the United States, I fail to see the possibility of allowing great concentrations to continue without greatly endangering the herds in question. It is our purpose to maintain scattered populations and to avoid excessive concentration. This we can do only by removing the game from concentrated areas, and by protecting game in areas of sparse population. There are at least three places on the Olympic Peninsula where the elk have congregated and have destroyed much of their winter range. To allow this concentration to continue is to jeopardize the herds themselves.

Mention is made that the summer range would support 25,000 elk. Elk increase at the rate of 15 to 30 per cent. If we estimate an increase of 20 per cent, it means that a herd of 25,000 would have to be reduced by 5,000 a year in order to maintain a stationary herd. It is almost impossible to have a kill as great as this. Even with a herd of 6,500, which is the number estimated, at least 1,000 should be taken out yearly in order to keep the herd down to this figure. A kill of a thousand elk in this area would be almost impossible at present because of public opinion regarding hunting take.

We are all interested in the same thing —the maintenance of the wildlife under sound biological conditions where food is sufficient to insure the herd against deterioration in size and vigor of the individual animal.

Concentrations are also dangerous because of the possibility of epidemics which might easily wipe out a whole herd. Morgenroth points out this fact that a shortage of food brings on excessive loss; this is the very thing we are attempting to avoid, and it can be avoided by rational policies of closing to hunters sparsely populated areas, and opening areas on which there exists a large or over-population of game. The whole subject calls for a meeting of minds and agreement on a practical method of approach.

Management is the best insurance we can give for the perpetuation of the species. Sentiment played so great a part in the consideration of wildlife problems that it is difficult to realize that with the present disturbed balance of nature (which probably never was balanced, even when primitive man was in control), some other than control by nature is needed to correct the situation.

With dense forests, such as you have in your region, the area is sure to be a true wilderness, for few people will wander far from the highways, and the dense vegetation makes the area rather inaccessible even though roads lie within a few hundred yards. We went all around the area and never glimpsed the great mountain. The Olympic Peninsula as a whole is a great area and has tremendous scenic, social, and economic values.

A broad and comprehensive program of land planning should be applied to it. To eliminate all uses except the scenic would not meet our social and economic needs; to close the area and not make the scenic grandeur a part of our educational and recreational plan would also be short-sighted. The preservation of a part of the great forest would seem to be better than to preserve the whole and allow it to deteriorate, as is the condition of some of the forests on the coast, west of the mountains.

H. L. Shantz,
Chief, Division of Wildlife Management,
U. S. Forest Service.

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Art.—article; ed.—editorial; rev.—review; art. (rev.)—review of article or book by; n.—briefer article and note; cor.—correspondence.